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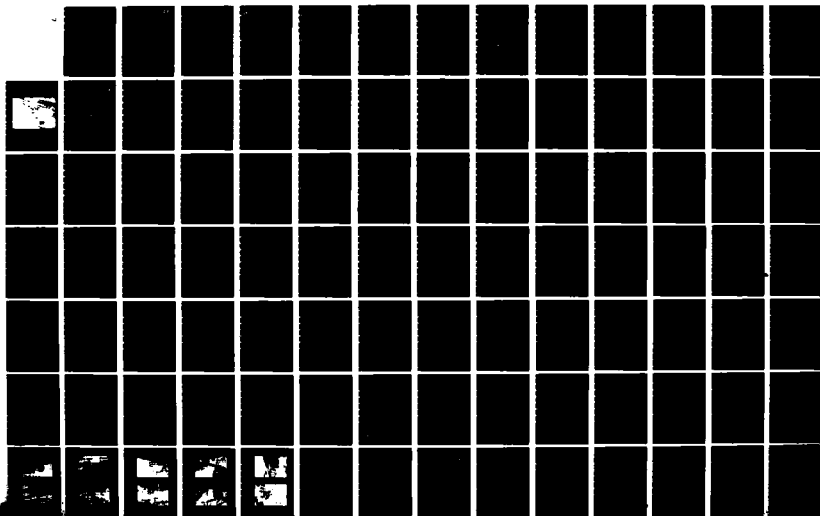
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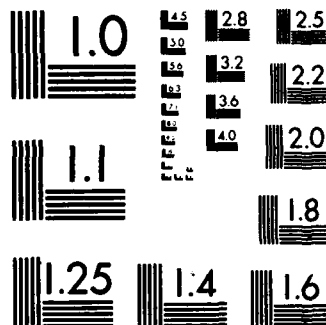
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**CONNECTICUT COASTAL BASIN
EAST LYME, CONNECTICUT**

AD-A143 495

**GORTON POND DAM
CT. 00157**

**PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM**

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**DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS.**

JANUARY, 1981

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) The dam at Gorton Pond is an earth embankment with the crest approx. 225 ft. in length including a spillway length of 62 ft. The dam is classified as SMALL in size and a SIGNIFICANT hazard structure in accordance with recommended guidelines established by the Corps of Engineers. The test flood is equal to $\frac{1}{2}$ the PMF.		



DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02254

REPLY TO
ATTENTION OF:
NEDED

MAY 08 1961

Honorable William A. O'Neill
Governor of the State of Connecticut
State Capitol
Hartford, Connecticut 06115

Dear Governor O'Neill:

Inclosed is a copy of the Gorton Pond Dam (CT-00157) Phase I Inspection Report, which was prepared under the National Program for Inspection of Non-Federal Dams. This report is presented for your use and is based upon a visual inspection, a review of the past performance and a brief hydrological study of the dam. A brief assessment is included at the beginning of the report. I have approved the report and support the findings and recommendations described in Section 7 and ask that you keep me informed of the actions taken to implement them. This follow-up action is a vitally important part of this program.

A copy of this report has been forwarded to the Department of Environmental Protection, the owner and cooperating agency for the State of Connecticut.

Copies of this report will be made available to the public, upon request, by this office under the Freedom of Information Act. In the case of this report the release date will be thirty days from the date of this letter.

I wish to take this opportunity to thank you and the Department of Environmental Protection for your cooperation in carrying out this program.

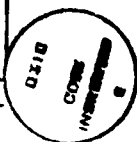
Sincerely,

A handwritten signature in dark ink, appearing to read "C.E. Edgar, III".

C.E. EDGAR, III
Colonel, Corps of Engineers
Division Engineer

Incl
As stated

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GORTON POND DAM

CT 00157

CONNECTICUT COASTAL BASIN

EAST LYME, CONNECTICUT

PHASE 1 INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

NATIONAL DAM INSPECTION REPORT

PHASE 1 INSPECTION REPORT

IDENTIFICATION NO: CT 00157
NAME OF DAM: Gorton Pond Dam
COUNTY AND STATE: New London County,
Connecticut
STREAM: Pataguanset River
DATE OF INSPECTION: 18 November 1980

Brief Assessment

The dam at Gorton Pond is an earth embankment with the crest approximately 225 feet in length including a spillway length of 62 feet. The dam consists of a 120 foot long main embankment, an overflow spillway and a 1-2 foot high earthen berm to the right of the spillway. The main embankment has a riprap crest and a downstream rock shell to a $1\frac{1}{2}$:1 slope. This section was reportedly designed to withstand occasional overtopping during high flows, however, no design data was found in the available files to substantiate this. The maximum height of the dam is 10 feet. The spillway is an uncontrolled concrete ogee weir and is located about 43 feet from the right dam abutment. The outlet works consists of a sluice gate controlled 36 inch square outlet and is located near the center of the embankment section. The sluice gate is manually operated. The dam has a storage capacity of 450 Ac-Ft at the spillway elevation of 27.0 NGVD and the reservoir and dam are used for recreation.

The dam is classified as SMALL in size and a SIGNIFICANT hazard structure in accordance with recommended guidelines established by the Corps of Engineers. Based on size and hazard classification, the adopted test flood for this structure is equal to one-half the Probable Maximum Flood (PMF) which is estimated to be 700 CSM, or 4,700 CFS, from the 6.7 square mile drainage basin. This test flood has a routed outflow discharge equal to 4,215 CFS and would overtop the dam by 3.0 feet. The maximum spillway capacity is equal to 450 CFS which represents only 11% of the test flood outflow, therefore, the spillway capacity is considered inadequate.

Based on a visual inspection at the site, the dam is considered to be in FAIR condition. The riprap at the abutments and downstream toe may not be adequate during overtopping and there may be no filter between the earth embankment at the downstream riprap shell. It is recommended that the owner engage the services of a registered engineer experienced in the design of dams to accomplish the following:

1. Perform detailed hydrologic and hydraulic studies to further assess the need for and means to increase the project discharge capacity and the ability to withstand overtopping.
2. Inspect and evaluate the spillway when no water is flowing over it.
3. Recommend and supervise the placement and repair of riprap at the abutments and downstream toe of the dam.
4. Evaluate the need for and design, as required, an effective filter between the downstream rock shell and the earth fill embankment behind.

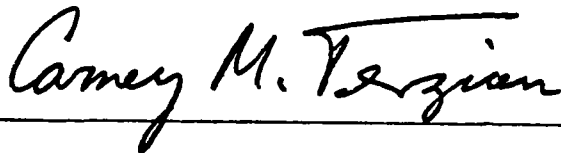
These and other recommendations and remedial measures as described in Section 7 should be implemented by the owner within one year after receipt of this Phase 1 Inspection Report.

NEW ENGLAND ENGINEERING, INC.

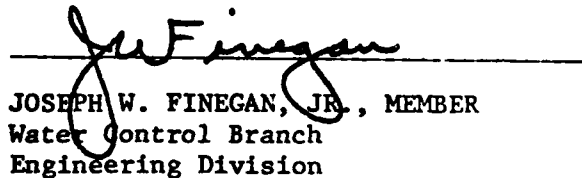
BY: David A. Sluter
David A. Sluter, P. E.
President



This Phase I Inspection Report on Gorton Pond Dam (CT-00157) has been reviewed by the undersigned Review Board members. In our opinion, the reported findings, conclusions, and recommendations are consistent with the Recommended Guidelines for Safety Inspection of Dams, and with good engineering judgement and practice, and is hereby submitted for approval.



CARNEY M. TERZIAN, MEMBER
Design Branch
Engineering Division

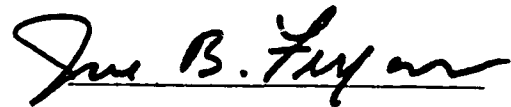


JOSEPH W. FINEGAN, JR., MEMBER
Water Control Branch
Engineering Division



ARAMAST MAHTESIAN, CHAIRMAN
Geotechnical Engineering Branch
Engineering Division

APPROVAL RECOMMENDED:



JOE B. FRYAR
Chief, Engineering Division

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase 1 Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, DC 20314. The purpose of a Phase 1 Investigation is to identify expeditiously those dams which may pose hazards to human life or to property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigations, testing, and detailed computational evaluations are beyond the scope of a Phase 1 investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection along with data available to the inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Phase 1 inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test Flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonable possible storm runoff), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition, and the downstream damage potential.

The Phase 1 Investigation does not include an assessment of the need for fences, gates, no-trespassing signs, repairs to existing fences and railings and other items which may be needed to minimize trespass and provide greater security for the facility and safety to the public. An evaluation of the project for compliance with OSHA rules and regulations is also excluded.

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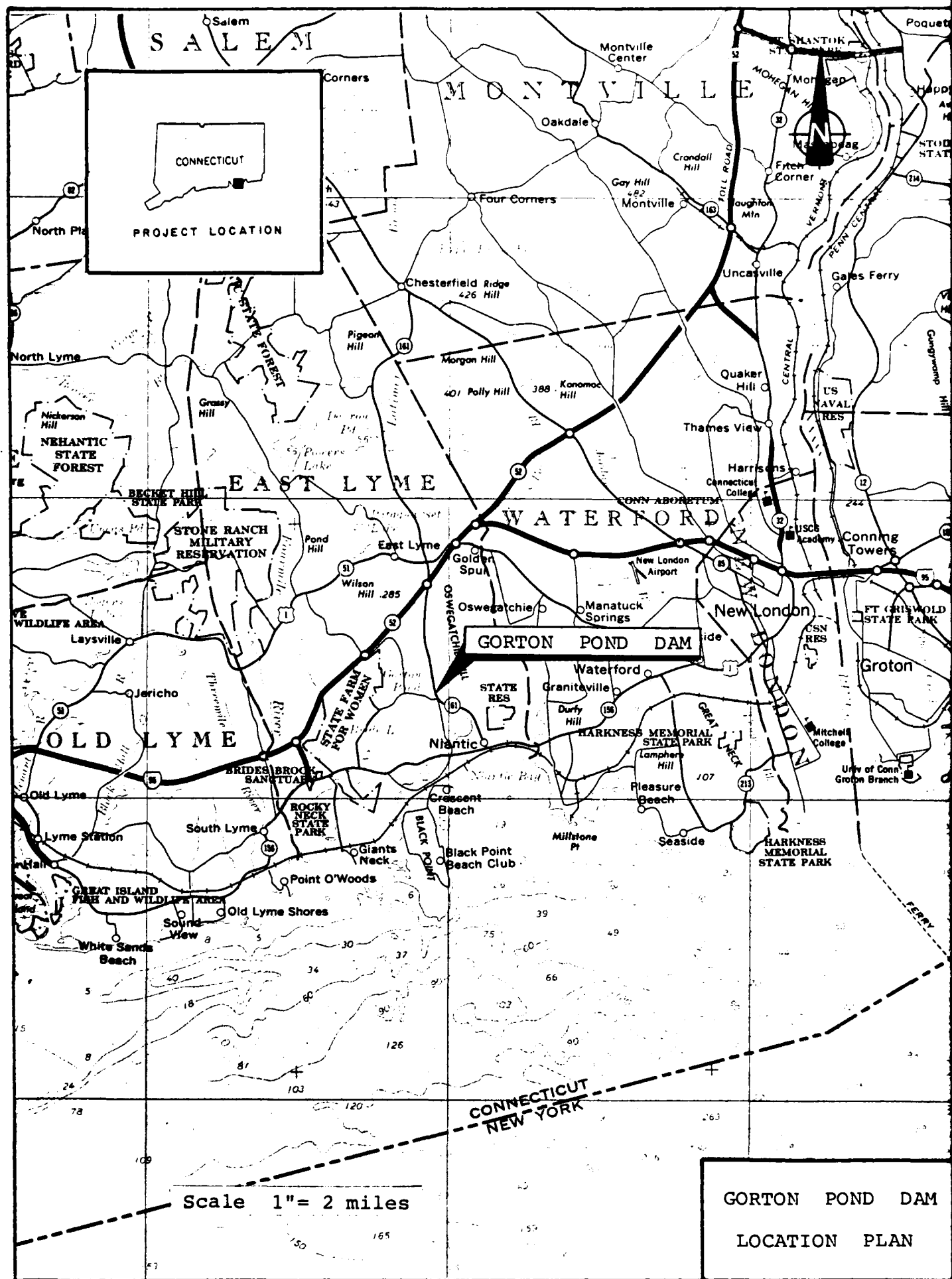
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OVERVIEW PHOTO - Gorton Pond Dam

December 31, 1980



GORTON POND DAM
LOCATION PLAN

NATIONAL DAM INSPECTION PROGRAM

PHASE 1 - INSPECTION PROGRAM

GORTON POND DAM

SECTION 1

PROJECT INFORMATION

1.1 General

- a. Authority. Public Law 92-367, August 8, 1972, authorized the Secretary of the Army through the Corps of Engineers to initiate a national program of dam inspection throughout the United States. The New England Division of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within the New England Region. New England Engineering, Inc. has been retained by the New England Division to inspect and report on selected dams in the State of Connecticut. Authorization and notice to proceed was issued to New England Engineering, Inc. under a letter from William E. Hodgson, Jr., Colonel, Corps of Engineers. Contract No. DACW33-81-C-0007 has been assigned by the Corps of Engineers for this work.
- b. Purpose of Inspection.
 1. Perform technical inspection and evaluation of non-Federal dams to identify conditions which threaten the public safety and thus permit correction in a timely manner by non-Federal interests.
 2. Encourage and assist the State to initiate quickly effective dam safety programs for non-Federal dams.
 3. To update, verify, and complete the National Inventory of Dams.

1.2 Description of the Project

- a. Location. Gorton Pond Dam is located in the Town of East Lyme, New London County, Connecticut on Flanders Road (Route 161) approximately 400 feet north of the intersection with Roxbury Road. Coordinates of the dam are approximately 41 degrees, 20.3' North Latitude, and 72 degrees, 12.5' West Longitude as shown on the Niantic, CT, USGS quadrangle sheet. The dam impounds water from the Pataguanset River which drains a 6.7 square mile watershed of rolling, wooded terrain. The axis of the pond is oriented in a North-South direction with the dam at the southern extremity of the pond.

- b. Description of the Dam and Appurtenances. Gorton Pond Dam is approximately 225 feet long including the spillway section with an average height of 7 to 8 feet and a crest width of 12 to 15 feet. The embankment is earth to the downstream crestline. At the crestline at elevation 28.5 NGVD, there is a buried vertical stone face from the original dam. In 1974 a downstream shell of riprap was placed against this vertical wall at a 1 1/2:1 slope. The crest is riprap with the voids filled with crushed stone. The upstream slope is 2:1. The concrete overflow spillway is 62 feet in length and is located on the right side of the dam. The spillway overflow drops 4 feet to a discharge channel which joins the original streambed approximately 120 feet downstream. To the right of the spillway, a 1-2 foot high earthen berm extends approximately 43 feet over the abutment area raising the ground level there. The entire berm is above the normal water level. The outlet works for the dam is a drawdown structure located near the center of the earth embankment section. This structure has a 36" x 36" opening with a steel sluice gate manually operated from the small platform above. Both the up and downstream sides of the shear gate are fitted with stop log guides.
- c. Size Classification. The dam at Gorton Pond has an impoundment capacity at the top of the dam (elev. 28.5 NGVD) equal to 540 Ac-Ft and a height of 10.0 feet. In accordance with guidelines established by the Corps of Engineers, this dam is classified as a SMALL size structure based on its impoundment capacity. Corps of Engineers guidelines specify that dams with impoundment capacities less than 1,000 Ac-Ft and greater than or equal to 50 Ac-Ft or a height of less than 40 feet and greater than or equal to 25 feet be classified as SMALL in size.
- d. Hazard Classification. This dam is classified a SIGNIFI-
CANT hazard potential because its failure could result in a loss of a few lives and inundation of four to five homes downstream of the dam. It is estimated that a dam failure would result in a failure discharge of 3,640 CFS and flooding to a depth of 1-2 feet in the homes located within the prime dam failure impact area. The prefailure discharge of 450 CFS would produce flooding to a depth of 0-1 feet in the affected homes. The dam failure discharge was computed assuming the water level in the reservoir to be equal to the top of dam elevation of 28.5 NGVD at the time of failure. In addition, four bridges located downstream of the dam would be subject to damage from flooding as a result of a dam failure.

- e. Ownership. The dam is presently owned by the State of Connecticut.
- f. Operator. The dam and gate are maintained and operated by the State of Connecticut, Department of Environmental Protection:

Mr. John Spencer
Area Manager
Region 3 Headquarters
Connecticut Dept. of
Environmental Protection
Marlborough, CT 06447
(203) 295-9523

- g. Purpose of Dam. The dam was formerly used to generate electrical and mechanical power and is presently used for recreation purposes.
- h. Design and Construction History. There are no available records on the history of the dam prior to 1963. It is estimated, however, that the original dam was constructed about 1860 to provide power for Niantic Mills at the dam site. Some time later ownership of the dam passed to the New England Steam Gauge Co., went out of commercial use and fell into disrepair.

In 1966 the dam and pond were purchased by the State of Connecticut for use as a recreational facility. Then in 1974 major repairs were undertaken to improve the condition of the dam. These repairs included construction of a new spillway section, new outlet structure, resurfacing of the embankment and filling of the downstream embankment slope with riprap. In the fall of 1977 additional repairs were made to the upstream slope in the spillway area to stop leakage that was occurring under the spillway.

Plans, specifications, and correspondence further describing these repair projects are included in Appendix B.

- i. Normal Operating Procedures. There are no written operational procedures for this dam. Normally, the water level is not regulated at the dam. Connecticut DEP personnel will open the gate at the pond in preparation for forecasted major flooding or at the request of the Town of East Lyme.

1.3 Pertinent Data

- a. Drainage Area. Gorton Pond Dam is located in the Town of East Lyme, New London, Connecticut. The drainage basin for the dam is located entirely within East Lyme and is generally oval in shape with a maximum length of

7 miles and a total area of 6.7 square miles. (See Appendix D for Basin Map). Approximately 20% of the watershed is natural storage. The topography is generally rolling, except in the upper reaches, with elevations ranging from 310 feet above Powers Pond to 27 feet at the spillway crest of the dam.

- b. Discharge at Damsite. There are no discharge records available for this dam. Listed below is calculated discharge data for the spillway and outlet works.

1. Outlet Works

Conduit size	36-inch square outlet
	Invert elevation
	21.5 feet NGVD.

a. Discharge Capacity	87 CFS at spillway crest elevation 27.0 feet NGVD.
-----------------------	--

b. Discharge Capacity	100 CFS at top of dam elevation 28.5 feet.
-----------------------	--

c. Discharge Capacity	126 CFS at the test flood elevation 31.5 feet NGVD.
-----------------------	---

2. Maximum known flood at damsite.	Elevation 29.0 NGVD reported in August 1955 (at original dam).
------------------------------------	--

3. Ungated spillway capacity at top of dam	450 CFS
--	---------

4. Ungated spillway capacity at test flood elevation	2,250 CFS
--	-----------

5. Gated spillway capacity at normal pool elevation	N/A
---	-----

6. Gated spillway capacity at test flood elevation	N/A
--	-----

7. Total spillway capacity at test flood elevation	2,250 CFS
--	-----------

8. Total project discharge at top of dam.	550 CFS
---	---------

9. Total project discharge at test flood elevation	4,215 CFS
--	-----------

c. Elevations (Feet above NGVD)

1.	Streambed at toe of dam	18.5
2.	Bottom of cutoff	Unknown
3.	Maximum tailwater	Unknown
4.	Normal pool	27.0
5.	Full flood control pool	N/A
6.	Spillway crest	27.0
7.	Design surcharge (Original Design)	Unknown
8.	Top of dam	28.5
9.	Test flood	31.5

d. Reservoir Lengths (in feet)

1.	Normal pool	5,100
2.	Flood control pool	N/A
3.	Spillway crest pool	5,100
4.	Top of dam	6,600
5.	Test flood pool	7,600

e. Storage (acre-feet)

1.	Normal pool	450
2.	Flood control pool	N/A
3.	Spillway crest pool	450
4.	Top of dam	540
5.	Test flood pool	810

f. Reservoir Surface Area (acres)

1.	Normal pool	55
2.	Flood control pool	N/A
3.	Spillway crest	55

	4.	Test flood pool	98
	5.	Top of dam	70
g.		<u>Dam</u>	
	1.	Type	Earth embankment
	2.	Length	225 feet including 62.0 feet of spillway.
	3.	Height	10 feet max - 8 feet average
	4.	Top width	12 to 15 feet.
	5.	Side slopes	2:1 U/S, 1½:1 D/S
	6.	Zoning	Stone masonry wall at the downstream crestline remains from the original dam. U/S is earth fill. D/S is rock fill.
	7.	Impervious Core	Clay core extending 3' on both sides of drawdown structure. Elsewhere unknown
	8.	Cutoff	Unknown
	9.	Grout Curtain	Unknown
	10.	Other	1-2 foot high earth berm over the right abutment.
h.		<u>Diversion and Regulating Tunnel</u>	N/A
i.		<u>Spillway</u>	
	1.	Type	Concrete ogee weir
	2.	Length of weir	62.0 feet
	3.	Crest elevation	27.0 feet
	4.	Gates	None
	5.	U/S Channel	Natural bed of Reservoir
	6.	D/S Channel	Riprap lined channel to natural bed of Pataguanset River

7. General

D/S Channel passes under a roadway bridge 350 feet downstream.

j. Regulating Outlets

- | | |
|----------------------|---|
| 1. Invert | 21.5 feet |
| 2. Size | 36-inch square opening |
| 3. Description | Concrete drawdown structure. |
| 4. Control Mechanism | Vertical lift sluice gate, manually operated from deck above. |
| 5. Other | ----- |

SECTION 2
ENGINEERING DATA

2.1 Design

There is no design information available for the original construction of this dam. Limited information on the design of repairs done in 1974 is available at:

Macchi Engineers
44 Gillett St.
Hartford, CT 06105

A copy of the overall plan and elevation of the dam repair, selected cross-sections, and the sitework specifications are included in Appendix B of this report.

2.2 Construction

No records of the original dam construction were found. Repair efforts since the mid 1960's are documented in the correspondence and inspection reports included in Appendix B of this report.

2.3 Operation

No operation records are maintained.

2.4 Evaluation

- a. Availability. No original design or construction information is available. Partial hydrologic information on flood flows used for the design of spillway repairs done in 1974 is available at the State of Connecticut Department of Environmental Protection. Selected pages are included in Appendix B.
- b. Adequacy. The lack of in-depth engineering design data did not allow for a definitive review. Therefore, the adequacy of this dam could not be assessed from the point of reviewing design and construction data, but is based primarily on visual inspection, past performance and sound engineering judgement.
- c. Validity. The validity of the limited data must be verified.

SECTION 3

VISUAL INSPECTION

3.1 Findings

- a. General. The Phase 1 visual inspection of the Gorton Pond Dam was conducted on November 19, 1980 by representatives of New England Engineering, Inc. and Geotechnical Engineers, Inc. A visual checklist and photographic record of that inspection have been included in Appendix A and C, respectively, of this report.

At the time of the inspection the water level was just over the spillway crest. The dam is about 225 feet long with a maximum height of 10 feet and an average height of 8 feet. The 62 foot wide spillway is located near the right abutment and the outlet structure is located near the center of the embankment.

Based on the visual inspection, the dam at Gorton Pond is judged to be in FAIR condition.

- b. Dam. The original dam was an earth embankment with a vertical stone wall on the downstream side. In 1974 a dumped riprap shell was added on the downstream side against the vertical stone wall (See Appendix B-3, Section A-A, and Photo C-2). As a part of the repairs in 1974, the crest and upstream slope were riprapped and crushed stone was used to fill the voids on the crest (Photo C-4).
 1. Upstream Face. The upstream face of the dam (Photo C-1) is riprap covered with a slope of 2:1. The riprap protection has brush growing through the rock. Some minor erosion has occurred. The right abutment area at the end of the spillway training wall has no riprap protection. The left abutment has incomplete riprap protection. However, there was no significant erosion observed at these locations.
 2. Crest. The crest of the dam (Photos C-3 and C-4) varies from 12 to 18 feet wide and is covered with a layer of riprap and then crushed stone filling the voids presenting a smooth crushed stone surface. There is some brush growing through this stone surface. At the contact between the crest and the left abutment (Photo C-4), riprap protection appears inadequate to prevent erosion during overtopping of the embankment.

3. Downstream Face. No information is available concerning the presence of filter material between the vertical stone face and the earth embankment. Also, it is not known whether the original stone wall was grouted. Overtopping of the dam crest (at elevation 28.5 NGVD) could result in the loss of fines from the earth embankment.

Minor seepage flowing clear (approximately 1 gpm) was observed to emerge from the riprap at the toe of the downstream slope adjacent to the left training wall of the spillway. The source of this seepage may be from leakage of overflow water through a crack in the downstream face of the spillway at the base of the left training wall.

Standing water was observed in the channel of an abandoned drawdown outlet about 15 feet downstream from the toe near the left abutment. This water was observed to be clear seepage emerging at an estimated rate of 10 gpm from the outlet in the left abutment (Photo C-10). Rusty stains were observed at the bottom of this ponded area.

4. Berm. At the right end of the dam is a small, low (1-2 feet) earthen berm over the abutment area. The berm is built entirely above the normal pool elevation and is probably intended to prevent flow around the spillway at moderately high flows. The berm/embankment is without riprap protection and covered with brush.

c. Appurtenant Structures.

1. Spillway. A concrete spillway 62 feet wide extends across the right side of the dam (Photo C-5). The approach channel was submerged and could not be inspected, and water was overflowing the spillway preventing full inspection of it. The concrete spillway weir is in fair condition. A 1/2 inch wide open crack at the contact of the downstream spillway face with the base of the left training wall was observed (Photo C-9). Water overflowing the spillway was observed to flow into the crack and thus enter the downstream rock shell. Seepage observed to exit at the base of the downstream slope adjacent to the left training wall was believed to result from flow into the crack (Photo C-9). Seepage was also observed to emerge through a construction joint at the top of the weir at the center of the spillway at an estimated rate of 4 gpm.

Previous inspections conducted when the reservoir level was below the spillway crest have reported considerable leakage emerging from beneath the downstream toe of the spillway. Repair of this leakage was undertaken in 1977 by the State of Connecticut. Water was overflowing the spillway at the time of inspection and the success of the repairs could not be confirmed. The downstream face and toe of the spillway should be inspected for seepage with no flow over the spillway.

2. Outlet Works. A concrete drawdown structure is located near the center of the embankment (Photos C-7 and C-8). The outlet is controlled with a 36 inch square sluice gate, operated from above. At the time of inspection the gate was closed and minor seepage at less than 1 gpm was observed to emerge from the bottom of the gate. Concrete on the upstream and downstream sides of the structure appeared to be in good condition. Both sides of the structure have stop log slots but no boards. The upstream and downstream training walls contained small hairline cracks in the construction joints.

On the left abutment of the dam, an old intake structure consisting of a concrete head wall and pipe which passes through the dam was, according to the Dam repair specifications included in Appendix B, plugged with concrete at the upstream end during the repairs in 1974. However, during the inspection, seepage was observed to emerge at a rate of approximately 10 gpm from the old outlet in the downstream left abutment. It could not be determined if the source of this seepage was from leakage into the plugged intake or leakage into the pipe itself from surrounding soils.

- d. Reservoir Area. No specific detrimental features in the reservoir area were observed during the visual inspection.
- e. Downstream Channel. The downstream channel (Photo C-6) is riprap lined for approximately 100 feet to where it joins the natural streambed of the Pataguanset River. There is a small island with several trees growing on it right at this junction. The channel banks below this point are unprotected earth and heavily overgrown with trees and brush obstructing the flow capacity. The downstream channel passes under a roadway bridge 350 feet from the dam.

3.2 Evaluation

Based on the visual inspection, the following features could adversely affect the future performance of the dam and should be investigated:

- a. Inadequate riprap protection at the abutments and downstream toe which could be eroded by the overtopping at higher flows.
- b. The presence or absence of a filter layer on the downstream side of the stone wall which formed the downstream face of the dam prior to 1974. Absence of filter material could permit erosion of earthfill from within the dam.
- c. Open joints in concrete at the left training wall of the spillway, and an open construction joint on the downstream face of the spillway.
- d. The source of seepage emerging from the plugged outlet in the left abutment.

SECTION 4

OPERATIONAL & MAINTENANCE PROCEDURES

4.1 Operational Procedures

- a. General. Gorton Pond is used by area residents as an recreational facility. Operational control is the responsibility of the Connecticut Department of Environmental Protection, Region 3. The outlet gate is opened only in preparation of forecasted flooding or at the request of the Town of East Lyme. Normally, the outlet structure remains closed and the water level is maintained at the spillway height.
- b. Warning System. There is no warning system in effect at Gorton Pond Dam. There is no formalized emergency action plan for the dam.

4.2 Maintenance Procedures

- a. General. Periodic maintenance of the dam is performed by Department of Environmental Protection personnel. This includes the repair of the upstream face done in 1977 to halt leakage under the spillway. Signs of erosion and brush growth on the embankment indicate that more periodic maintenance is required.
- b. Operating Facilities. The outlet works is of relatively new construction and the sluice gate and operator are of durable quality. The outlet works are operated occasionally which should be all that is needed to maintain a satisfactory condition. The spillway is in need of repair at the joint with the left training wall.

4.3 Evaluation

- a. There is no regularly scheduled maintenance for this dam. As described above, there are several maintenance deficiencies. A systematic inspection and rehabilitation program should be developed and implemented. The gates should be periodically operated, lubricated, and cleared of all debris to insure proper performance. The condition of the spillway should be determined based on an inspection during a no-flow condition.
- b. An emergency action plan should be developed and implemented that will provide for inspection and monitoring of the facility by a representative of the Owner and a course of action determined that should be followed during critical situations. The plan should include as a minimum: the authorities to be contacted; the locations of emergency materials, equipment or manpower to prevent or minimize failure. Procedures for lowering the reservoir should be listed.

SECTION 5

EVALUATION OF HYDRAULIC/HYDROLOGIC FEATURES

5.1 General

The dam at Gorton Pond was constructed around 1860 probably as a source of power for the adjacent factory. The dam is located on the Pataguanset River in the Connecticut Coastal Basin. The watershed for the reservoir is 6.7 square miles with approximately 20% of this basin man-made or natural storage.

The dam has a spillway length of 62 feet and a maximum height of 10 feet. The total length of the dam is 225 feet. The reservoir has a storage capacity at the spillway crest of 450 Ac-Ft and can accommodate 1.44 inches of runoff from the watershed. Each foot of depth above the spillway level can accommodate 66 Ac-Ft of water equivalent to 0.18 inches of runoff.

It will take 9+ hours to lower the reservoir 1 foot based on a surface area of 55 acres and an outflow of 75 cfs. For the 450 Ac-Ft of storage below the spillway it is estimated that it would take 3 days to drain the reservoir.

5.2 Design Data

Little specific data is available for this watershed or structure. As a part of the design of the repairs to the dam in 1974, Macchi & Hoffman computed a 100 year peak discharge of 1,110 CFS (See Appendix B-2). Their calculations show that the dam would be overtopped by approximately 1.5 feet during the 100 year flood. In lieu of existing complete design information, U.S.G.S topographic maps (scale 1" = 2,000 ft.) were utilized to develop hydrologic parameters such as: drainage area, reservoir surface areas, basin slopes, time of concentration and other runoff characteristics. Elevation-storage relationships for the reservoir were approximated. Some of the pertinent hydraulic data was obtained and/or confirmed by actual field measurements at the time of the visual inspection. Test flood inflows and outflows and dam failure flows were determined in accordance with the Corps of Engineers guidelines.

5.3 Experience Data

No historical data for recorded discharges is available for this dam. A property owner has reported that the water level rose to the floor of the cottage located at the left abutment (estimated to be elevation 29.0 NGVD).

5.4. Test Flood Analysis

Recommended guidelines for the Safety Inspection of Dams by the Corps of Engineers were used for selection of the Test Flood. This dam is classified under those guidelines as a SIGNIFICANT hazard and SMALL in size. Guidelines indicate that a storm event equal to 100 year to one-half the PMF be used as a range of test floods for such a classification. One-half the PMF was selected as the test flood because of the potential downstream damage. The watershed has a total drainage area equal to 6.7 square miles of which approximately 20% is manmade or natural storage. This drainage area is moderately populated, fairly wooded, with rolling topography.

A test flood value was selected from the Corps of Engineers PMF curve for a watershed with flat to rolling topography and reduced by 20% for storage within the watershed. A test flood inflow was calculated to be 700 CSM, equal to 4,700 CFS and was adopted for this analysis. The routed outflow discharge for the test flood inflow was 4,215 CFS. The spillway and outlet rating curves are illustrated in Appendix D. Flood routing was performed assuming a full reservoir at the spillway crest and the outlet to be open.

The analysis indicated that the capacity of the spillway is hydraulically inadequate to pass the test flood outflow and this outflow would overtop the dam by approximately 3.0 feet. The maximum outflow capacity of the spillway alone to the crest of the overflow portion of embankment is 540 cfs or 13% of the test flood. The maximum outflow capacity of the spillway at the top of dam elevation 28.5 is 450 cfs or 11% of the test flood.

5.5 Dam Failure Analysis

For this analysis a full-depth, partial-width breach was assumed to have occurred in this dam. The adopted breach width of 60 feet was based on 40% of the dam length at mid-height. A dam failure discharge of 3,640 CFS was calculated assuming the reservoir level to be at the top of dam elevation 28.5. The dam failure discharge of 3,640 CFS includes a spillway discharge of 450 CFS. It is estimated that failure could result in an inundation of 4-5 homes located downstream of the dam to a depth of 1-2 feet and the loss of a few lives. The prefailure discharge of 450 CFS would result in 0-1 feet of flooding in the homes. Four bridges downstream of the dam are located within the failure impact area and would be subject to flood damage. The prime impact area that would be subject to damage if the dam were to fail has been delineated on the Dam Failure Impact Area Map in Appendix D. As a result of the failure analysis, the dam has been classified as a SIGNIFICANT hazard structure.

SECTION 6

EVALUATION OF STRUCTURAL STABILITY

6.1 Visual Observations

The visual examination of the dam did not indicate any structural stability problems.

6.2 Design and Construction Data

There are no design and construction data available for the dam as built in 1860.

6.3 Post-Construction Changes

In 1974 the following changes were made to the dam to improve its stability:

- a. Placement of a shell of riprap on the downstream side of the stone masonry wall that formerly was the downstream face of the dam, to improve the stability of the wall. A filter layer upstream from the riprap shell was not included in the design.
- b. The crest was lowered by 1 foot and riprap and crushed stone were added to the top.
- c. Construction of a new spillway consisting of a concrete slab poured over placed riprap and the existing stone masonry wall as indicated in the repair plans and specifications in Appendix B.
- d. Subsequent inspections of the dam reported seepage from beneath the downstream toe of the spillway with estimated rates 1 to 10 cfs. Remedial measures proposed for this condition included reconstruction of the impermeable clay blanket on the upstream side of the dam and spillway. Completion of this construction was scheduled for 1978; records of this construction are not available.

6.4 Seismic Stability

This dam is in Seismic Zone 1 and, in accordance with recommended guidelines, does not warrant seismic analysis.

SECTION 7

ASSESSMENT, RECOMMENDATIONS AND REMEDIAL MEASURES

7.1 Dam Assessment

- a. Condition. Based on the visual inspection, this dam appears to be in FAIR condition. Features which could adversely affect the condition of the dam in the future are:
 1. Lack of riprap protection on the left and right abutments, insufficient riprap protection at the downstream toe, and irregular riprap slope protection on the upstream slope.
 2. Lack of a filter layer between the downstream shell and the original riprap to prevent erosion of material from within the embankment.
 3. A 1/2" wide crack in the downstream concrete face of the spillway at the base of the left training wall which permits seepage of water overflowing the spillway into the embankment.
 4. Unknown source of seepage from plugged outlet on the left abutment.
- b. Adequacy of Information. The Phase 1 inspection was based on the visual inspection on site and the available repair design plans. The construction inspection reports are not available.
- c. Urgency. The recommendations and remedial measures described below should be implemented by the owner within one year after receipt of the Phase 1 report.

7.2 Recommendations

An engineer qualified in the design of earth dams should be engaged to:

- a. Conduct further, more detailed hydrologic and hydraulic studies to assess the need for and determine methods to increase the discharge capacity of the dam.
- b. Inspect the downstream face and toe of the spillway for seepage when the reservoir level is below the spillway crest.
- c. Recommend and supervise the repair of riprap on the upstream slope, left and right abutments and downstream toe of the dam.

- d. Investigate the lack of a filter on the upstream side of the downstream riprap shell and design an effective filter and supervise its construction where such a filter is required.
- e. Determine the source and potential effects of seepage emerging from the plugged outlet on the left abutment.
- f. Design and inspect the repair of cracks in the downstream face of the concrete spillway.

7.3 Remedial Measures

a. Operation and Maintenance Procedures

- 1. Develop an "Emergency Action Plan" that will include an effective preplanned downstream warning system, locations of emergency equipment, materials and manpower, authorities to contact and potential areas that require evaluation.
- 2. Clear brush, vines and trees on downstream and upstream slopes and the berm at the right end of the dam. Maintain clear by cutting at least annually to 15 feet below the dam.
- 3. Institute program of annual technical inspection by qualified registered engineers.

7.4 Alternatives

There were no practical alternatives to the recommendations discussed above.

APPENDIX A
INSPECTION CHECKLIST

1

VISUAL INSPECTION CHECKLIST
PARTY ORGANIZATION

PROJECT GORTON POND DAM - CT 157

DATE Nov. 19, 1980

TIME 1:15 p.m.

WEATHER Sunny, 40 degrees

W.S. ELEV. 27.0 U.S. 19.0 DN.S.

PARTY:

1. David Sluter - New England Engineering
2. Stephen Fodor - New England Engineering
3. Steve Poulos - GEI 8. _____
4. Robert Stetkar - GEI 9. _____
5. _____ 10. _____

PROJECT FEATURE	INSPECTED BY	REMARKS
1. <u>Geotechnical</u>	<u>S. Poulos, R. Stetkar</u>	
2. <u>Hydrology & Hydraulics</u>	<u>D. Sluter</u>	
3. <u>Civil</u>	<u>S. Fodor</u>	
4. _____		
5. _____		
6. _____		
7. _____		
8. _____		
9. _____		
10. _____		

PERIODIC INSPECTION CHECKLIST

PROJECT GORTON POND DAM DATE Nov. 19, 1980
 PROJECT FEATURE Dam Embankment NAME Sluter/Fodor
 DISCIPLINE Geotechnical/Civil NAME Poulos/Stetkar

AREA EVALUATED	CONDITION
<u>DAM EMBANKMENT</u>	
Crest Elevation	28.5
Current Pool Elevation	Spillway crest. 27.0
Maximum Impoundment to Date	Unknown
Surface Cracks	None observed.
Pavement Condition	N/A
Movement or Settlement of Crest	Crest irregular. No significant movement or settlement observed.
Lateral Movement	None observed.
Vertical Alignment	Good
Horizontal Alignment	Good
Condition at Abutment and at Concrete Structures	No riprap protection at left or right abutments. Minor erosion.
Indications of Movement of Structural Items on Slopes	N/A
Trespassing on Slopes	Free access. Some stone and gravel displaced on crest.
Sloughing or Erosion of Slopes or Abutments	Minor erosion upstream at left and right abutments and near spillway left training wall.
Rock Slope Protection - Riprap Failures	Upstream - Irregular cover. Riprap 1-3 feet in diameter. Downstream - Riprap on downstream slope 2-4 feet diameter and in good condition. Large voids between riprap. No riprap downstream of toe of over-flow portion of embankment.

2A

PERIODIC INSPECTION CHECKLIST

PROJECT GORTON POND DAM DATE Nov. 19, 1980
 PROJECT FEATURE Dam Embankment NAME Sluter/Fodor
 DISCIPLINE Geotechnical/Civil NAME Poulos/Stetkar

AREA EVALUATED	CONDITION
<u>DAM EMBANKMENT</u>	
Unusual Movement or Cracking at or Near Toe	None observed.
Unusual Embankment or Downstream Seepage	Minor seepage through downstream toe adjacent to spillway left training wall. Seepage from abandoned outlet on downstream left abutment flowing clear at ~10 gpm.
Piping or Boils	None observed.
Foundation Drainage Features	None.
Toe Drains	None.
Instrumentation System	None.
Vegetation	Grass and small brush between riprap on upstream slope. Occasional brush between riprap on downstream slope.

PERIODIC INSPECTION CHECKLIST

PROJECT GORTON POND DAM DATE Nov. 19, 1980
 PROJECT FEATURE Embankment NAME Sluter/Fodor
 DISCIPLINE Geotechnical/Civil NAME Poulos/Stetkar

AREA EVALUATED	CONDITION
<u>DIKE EMBANKMENT</u> Crest Elevation Current Pool Elevation Maximum Impoundment to Date Surface Cracks Pavement Condition Movement or Settlement of Crest Lateral Movement Vertical Alignment Horizontal Alignment Condition at Abutment and at Concrete Structures Indications of Movement of Structural Items on Slopes Trespassing on Slopes Sloughing or Erosion of Slopes or Abutments Rock Slope Protection - Riprap Failures Unusual Movement or Cracking at or Near Toes Unusual Embankment or Downstream Seepage Piping or Boils Foundation Drainage Features Toe Drains Instrumentation System Vegetation	No dike embankment.

PERIODIC INSPECTION CHECKLIST

PROJECT GORTON POND DAMDATE Nov. 19, 1980PROJECT FEATURE Drawdown StructureNAME Poulos/StetkarDISCIPLINE Geotechnical/Civil/HydraulicNAME Sluter/Fodor

AREA EVALUATED	CONDITION
<p><u>OUTLET WORKS - INTAKE CHANNEL AND INTAKE STRUCTURE</u></p> <p>a. Approach Channel</p> <p>Slope Conditions</p> <p>Bottom Conditions</p> <p>Rock Slides or Falls</p> <p>Log Boom</p> <p>Debris</p> <p>Condition of Concrete Lining</p> <p>Drains or Weep Holes</p> <p>b. Intake Structure</p> <p>Condition of Concrete</p> <p>Stop Logs and Slots</p>	<p>Submerged at time of inspection.</p> <p>Not observable.</p> <p>Not observable.</p> <p>None.</p> <p>None.</p> <p>Minor debris consisting of small tree branches and leaves.</p> <p>N/A.</p> <p>N/A.</p> <p>Consists of two concrete wing wells.</p> <p>Good condition.</p> <p>3" slots in wing wells, no boards.</p>

PERIODIC INSPECTION CHECKLIST

PROJECT GORTON POND DAM DATE Nov. 19, 1980
 PROJECT FEATURE _____ NAME Poulos/Stetkar
 DISCIPLINE _____ NAME Sluter/Fodor

AREA EVALUATED	CONDITION
<p><u>OUTLET WORKS - CONTROL TOWER</u></p> <p>a. Concrete and Structural</p> <p>General Condition</p> <p>Condition of Joints</p> <p>Spalling</p> <p>Visible Reinforcing</p> <p>Rusting or Staining of Concrete</p> <p>Any Seepage or Efflorescence</p> <p>Joint Alignment</p> <p>Unusual Seepage or Leaks in Gate Chamber</p> <p>Cracks</p> <p>Rusting or Corrosion of Steel</p> <p>b. Mechanical and Electrical</p> <p>Air Vents</p> <p>Float Wells</p> <p>Crane Hoist</p> <p>Elevator</p> <p>Hydraulic System</p> <p>Service Gates</p> <p>Emergency Gates</p> <p>Lightning Protection System</p> <p>Emergency Power System</p> <p>Wiring and Lighting System</p>	<p>See Outlet Works - Outlet Structure.</p>

PERIODIC INSPECTION CHECKLIST

PROJECT GORTON POND DAM DATE Nov. 19, 1980
PROJECT FEATURE _____ NAME Poulos/Stetkar
DISCIPLINE _____ NAME Sluter/Fodor

AREA EVALUATED	CONDITION
<u>OUTLET WORKS - TRANSITION AND CONDUIT</u> General Condition of Concrete Rust or Staining on Concrete Spalling Erosion or Cavitation Cracking Alignment of Monoliths Alignment of Joints Numbering of Monoliths	Not Applicable.

PERIODIC INSPECTION CHECKLIST

PROJECT GORTON POND DAM DATE Nov. 19, 1980
 PROJECT FEATURE Drawdown Structure NAME Sluter/Fodor
 DISCIPLINE Civil/Geotechnical/Hydraulic NAME Poulos/Stetkar

AREA EVALUATED	CONDITION
<u>OUTLET WORKS - OUTLET STRUCTURE AND OUTLET CHANNEL</u>	
General Condition of Concrete	Good.
Rust or Staining	None observed.
Spalling	None.
Erosion or Cavitation	None observed.
Visible Reinforcing	None.
Any Seepage or Efflorescence	Minor seepage from low-level outlet gage.
Condition at Joints	Hairline cracks at joints in right and left training walls.
Drain holes	Two 4-in. drain holes on each downstream training wall. Upper hole on right training wall apparently blocked with large stone. Large riprap with voids behind wall visible through other drain holes.
Channel	3-ft-long concrete apron and riprap.
Loose Rock or Trees Overhanging Channel	Some small brush and trees.
Condition of Discharge Channel	Satisfactory - Riprap in channel is higher than outlet apron.

PERIODIC INSPECTION CHECKLIST

PROJECT GORTON POND DAM DATE Nov. 19, 1980
 PROJECT FEATURE Spillway NAME Poulos/Stetkar
 DISCIPLINE Civil/Hydraulic/Geotechnical NAME Sluter/Fodor

AREA EVALUATED	CONDITION
<u>OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS</u>	
a. Approach Channel	Under water.
General Condition	Satisfactory.
Loose Rock Overhanging Channel	None.
Trees Overhanging Channel	None.
Floor of Approach Channel	Under water - not observable.
b. Weir and Training Walls	Water overflowing spillway at time of inspection.
General Condition of Concrete	Fair. Left training wall separated from weir by $\frac{1}{2}$ -in. crack due to erosion of concrete. Small $\frac{1}{32}$ -in. crack on left training wall.
Rust or Staining	None observed.
Spalling	Minor spalling at base of fence post on right training wall.
Any Visible Reinforcing	None.
Any Seepage or Efflorescence	Seepage through construction joint in weir at center of spillway at ≈ 4 gpm.
Drain Holes	None.
c. Discharge Channel	
General Condition	Good.
Loose Rock Overhanging Channel	None.
Trees Overhanging Channel	Some trees and small brush.
Floor of Channel	Riprap.
Other Obstructions	Small island in channel ≈ 100 ft. downstream of weir.
Other Comments	None.

PERIODIC INSPECTION CHECKLIST

PROJECT GORTON POND DAM DATE Nov. 19, 1980
 PROJECT FEATURE _____ NAME Poulos/Stetkar
 DISCIPLINE _____ NAME Sluter/Fodor

AREA EVALUATED	CONDITION
<u>OUTLET WORKS - SERVICE BRIDGE</u> a. Super Structure Bearings Anchor Bolts Bridge Seat Longitudinal Members Underside of Deck Secondary Bracing Deck Drainage System Railings Expansion Joints Paint b. Abutment & Piers General Condition of Concrete Alignment of Abutment Approach to Bridge Condition of Seat & Backwall	Not applicable.

APPENDIX B
ENGINEERING DATA

APPENDIX B-1

SELECTED COPIES OF PAST INSPECTION REPORTS

Interdepartment Message

STO-201 REV 3-77 STATE OF CONNECTICUT
(Stock No. 6938-051-011)

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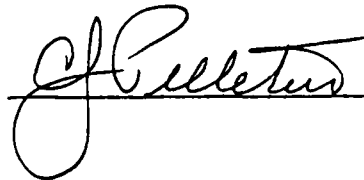
To	NAME Victor F. Galgowski	TITLE Supt. Dam Maintenance	DATE January 24, 1979
	AGENCY DEP - Water Resources	ADDRESS	
From	NAME Charles Pelletier	TITLE Consultant	TELEPHONE
	AGENCY	ADDRESS	
SUBJECT GROTON POND - EAST LYME			

This dam was inspected on January 24, 1979, in the company of the East Lyme Selectman and Town Engineer.

It was evident that the dam was overtopped last weekend and that the stone cover had resisted erosion except in the area adjacent to the gate structure. This problem area was noted during an inspection about one year ago.

Since that time, the earth fill beneath the rock cover at the west side of the gate structure has eroded noticeably. Probably most of the erosion occurred during the recent high water. Erosion in this area will advance with each occurrence of high water with eventual loss of normal pondage.

This situation may be the result of inadequate compaction of backfill between the pre-existing dam and the concrete gate structure. It may be possible to correct the situation by filling voids in the rock protection with fine material. If the backfill placed during reconstruction is not compacted, it will probably be necessary to remove the rock and stone cover and rework the backfill.



HAVING CLEARED WITH BOB WILDE WE INFORMED
TO SELECTMAN THAT WE WOULD NOT BE ABLE TO
MAINTAIN FLOOD LEVEL 1' ABOVE SPILL

COPY



STATE OF CONNECTICUT

DEPARTMENT OF ENVIRONMENTAL PROTECTION

STATE OFFICE BUILDING

HARTFORD, CONNECTICUT 06115

COPY

20 December 1977

Hon. Christopher J. Dodd
Member of Congress
1 Thames Plaza
Norwich, Connecticut 06360

Re: Gorton Pond Dam
East Lyme

Dear Chris:

This refers to your letter of December 6, 1977 seeking information pertaining to the subject dam.

Following former Commissioner Gills letter to you, the dam was investigated by members of our Fish and Water Life Unit and an engineering consultant retained by our Department. The inspection revealed that the contractor who rebuilt the spillway in 1974 used unsuitable material. As a result, a severe leakage problem under the spillway section developed. It became increasingly difficult to maintain the normal pond elevation. This lower elevation may have affected wells in the vicinity of the pond.

At the present time, Department maintenance personnel have drained the impoundment and are undertaking repairs necessary to seal the leaks. Weather permitting, the project should be completed by February 1, 1978. Upon completion, the pond will be refilled. Hopefully, this will bring an end to well problems in the area.

Sincerely yours,

Stanley J. Pac
Commissioner

SJP:ljk

Supervision of Dams
Water Resources Unit
Telephone no. 566-7245

bcc: Theodore B. Bampton

FOR PROJECT FUNDS

IMPROVEMENTS,

MAINTENANCE AND DEMOLITIONS

JOI REV 1-66

DEPARTMENT OF FINANCE AND CONTROL, Budget Division

DEPARTMENT OF PUBLIC WORKS

Submit five copies to the Budget Director.

Attach as many additional sheets as necessary to give details in full.

Priority Number ranking assigned by Agency when more than one project is requested at one time.

NO

AGENCY OR INSTITUTION	Division of	DATE
- DEPT. OF ENVIRONMENTAL PROTECTION - Conservation & Preservation		October 3, 1977
TITLE OF REQUESTED PROJECT		COST ESTIMATE
Repairs to Gorton Pond Dam in East Lyme		\$3500.00

1. Statement of need:
Severe leakage problems of the spillway structure must be corrected before permanent structural damage occurs. This is a D.E.P. owned dam that was rebuilt in 1974 under PROJECT #BI-BB-82.
2. Name and give use of construction to be accomplished (Give project number or any other information that will help locate original drawings. In case of utility lines, site work, beach work, etc., give location, furnish any existing borings and topo information that is available.)
3. Outline work to be accomplished in as much detail as possible. (Include sketches, plot plans and other pertinent information.)
Unsuitable material will be excavated from the upstream face of the spillway and replaced with specified layers of crushed stone, sand, and clay to eliminate the severe leakage problems.
4. Special features, etc. (Describe any special features required such as security measures, special construction, schedule required, if any will be required and used during construction, etc. Attach copies of reports by any agency which relate.)
Draw-down of pond water level will have to be arranged.
5. Equipment: List any new equipment required and list existing equipment that may be reused.
Department equipment - payloader and dump trucks.
6. Remarks: - Work must be completed prior to November 15 due to extreme weather conditions. This dam was inspected by Jim Sullivan and Paul Glinski of Finance and Control. At that time it was determined that D.E.P. would have to finance and take care of engineering studies. This has been done. It is felt that work can be accomplished with our forces. This will not only save money, but will expedite the project.

THESE ANSWERS PREPARED BY

Operations and
Leslie Whitham, Ass't. Chief-Maintenance

APPROVED (Signature of Agency Representative)

APPROVED (Finance Commissioner)

(Date)

FUND

APPROVED (Budget Division)

Interdepartment MessageSTO-201 REV. 3/74 STATE OF CONNECTICUT
(Stock No. 6938-051-01)

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To	NAME	Edward J. Daly	TITLE	Director	DATE	14 February 1977
	AGENCY	Water Resources Unit	ADDRESS			
From	NAME	Victor F. Galgowski	TITLE	Supt. of Dam Maintenance	TELEPHONE	
	AGENCY	Environmental Protection	ADDRESS			

SUBJECT

Gorton Pond - East Lyme

On December 7, 1973, this unit issued a Construction Permit for repairs to the subject dam in accordance with plans prepared by Macchi-Hoffman Engineers.

Inspections of the site by staff members in January and October of 1976 revealed considerable leakage under the recently repaired spillway section (est. 600-700 gal/minute). The Fish and Water Life Unit was informed the leakage did not jeopardize the safety of the dam, however, continued deterioration would lead to eventual draining of the pond.

As the request of the Fish and Water Life Unit, regional maintenance personnel opened the gate to lower the pond elevation in preparation for detailed inspection by Mr. Macchi during the first week in December. Although the amount of water released was not excessive, some damage was done to a wetland project being conducted downstream in conjunction with our Inland Wetlands Program. *STAFF*
To the best of my knowledge, no member of the Water Resources Unit was given prior notification of the planned release of water.

VFG:ljlk

Interdepartment MessageSTO-201 REV. 3/74 STATE OF CONNECTICUT
(Stock No. 6938-051-01)

SAVE TIME: Handwritten messages are acceptable.

Use carbon if you really need a copy. If typewritten, ignore faint lines.

To	NAME	Victor F. Galgowski	TITLE	Supt. of Dam Maintenance	DATE	14 October 1976
	AGENCY	Water Resources Unit	ADDRESS			
From	NAME	Charles J. Pelletier	TITLE	Consultant	TELEPHONE	
	AGENCY	Environmental Protection	ADDRESS			

SUBJECT

Gorton Pond Dam, East Lyme

We viewed this structure on October 13, 1976, in connection with a complaint about a well which had gone dry allegedly as a result of the installation of the dam.

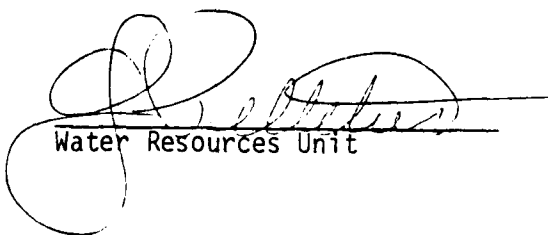
Substantial repairs were made to this structure about two years ago. The structure is in good repair except for leakage under the spillway structure. At the time of observation, flow was estimated to be 600-700 gallons per minute. The pond was about two inches below the spillway crest and all flow was passing under the concrete spillway structure which is in the form of a concrete shell.

Some seepage was also observed immediately downstream from the drawdown gate structure.

There is no condition evident to cause concern that the dam might fail and release a large amount of water suddenly.

The flow passing under the concrete shell is probably coming through voids at shallow depth under the concrete.

Pending further investigation, it appears that the leakage may be corrected by placing a cutoff or impervious blanket, along the upstream side of the dam and filling voids inside the concrete shell with grout or other suitable material.



Water Resources Unit

CJP:ljc

Interdepartment Message

STO-201 REV. 3/74 STATE OF CONNECTICUT
(Stock No. 693R-051-01)

SAVE TIME: Handwritten messages are acceptable.

Use carbon if you really need a copy. If typewritten, ignore faint lines.

To	NAME	Edward J. Daly	TITLE	Director	DATE	26 January 1976
	AGENCY	Water Resources Unit	ADDRESS			
From	NAME	Robert E. Sonnichsen	TITLE	Engineer Intern	TELEPHONE	
	AGENCY	Water Resources Unit	ADDRESS			
SUBJECT						

Dam Inspection - Gorton Pond Dam, East Lyme

Following reports by a property owner in the vicinity of Gorton Pond and Chuck Phillips of Region III that leakage under the spillway at Gorton Pond Dam had increased significantly, I made an inspection of the structure on January 19, 1976.

My inspection concentrated on the spillway at the dam. The dam's gate valve was partially open and the pond elevation was drawn down approximately eight inches below the spillway crest. During my former inspections of the structure, water was flowing over the spillway masking the leakage problems that exist. On January 19, water was flowing under the entire length of the spillway and down the spillway exit channel at a rate I estimated to be between 10-15 c.f.s. or approximately 80-120 gallons/seconds. This quantity of leakage is significant for a dam structure of this type.

Examination of repair design plans for Gorton Pond (approval date December 7, 1973) designed by Macchi and Hoffman Engineers, show that the rebuilt spillway section consists of a concrete slab poured over rip-rap and the existing dry stone masonry dam. The attached diagram shows a typical cross section of the rebuilt spillway. Probable leakage patterns are shown in orange.

No attempt was made to prevent leakage through the existing dry masonry structure. The two cutoff walls (marked in red on the diagram) were included in the design to add stability to the structure and to cut off seepage flows. The cutoffs continue to aid in stabilizing the structure against lateral movement, but have not relieved the leakage problems.

The type of leakage that exists under the spillway of this structure can be considered as leakage through any dry masonry dam. Since no investigation of the foundation of the masonry structure was made prior to rebuilding the dam, foundation conditions under the spillway cannot be known with any certainty.

Regardless of the exact location of seepage paths through the structure, this dam cannot be considered to be in good condition because of the relatively large quantity of flow.

★ Slight movement of the concrete spillway slabs was also noted at the time of this inspection. A construction joint at the center section of the spillway has widened and water has begun to seep through the joint. The presence of this seepage leads to the conclusion that there is water present within the masonry work under the concrete slabs. This water within the structure can lead to structural problems.

Apart from the possible instability of the dam spillway section, continued leakage will lead to other undesirable results. During the winter months extreme cold may form ice lenses within the structure and cause movement of the masonry work and cracking of concrete. Another problem that may result is that during times of low flow it may be difficult to retain pond elevations.

It is my opinion that repairs should be made to control this severe leakage problem before further deterioration and eventual failure of the dam result.

Water Resources Unit

RES:ljc



STATE OF CONNECTICUT
DEPARTMENT OF ENVIRONMENTAL PROTECTION

STATE OFFICE BUILDING

HARTFORD, CONNECTICUT 06115

WATER AND RELATED RESOURCES

CONSTRUCTION PERMIT FOR DAM

7 December 1973

Mr. Paul J. Manafort, Commissioner
Public Works Department
State Office Building
Hartford, Connecticut 06115

GORTON POND DAM

TOWN: East Lyme
RIVER: Patuxet River
TRIBUTARY:

Dear Commissioner Manafort:

Your application for a permit to ^(repair)
~~(construct)~~ a dam on the

Patuxet River

in the Town of East Lyme in accordance

with plans prepared by Macchi & Hoffman Engineers

dated 20 November 1973 has been reviewed.

The construction, in accordance with those plans, is APPROVED under the conditions which follow.

- I. The Commissioner shall be notified as follows:
 - a) When construction has started.
 - b) When project is complete and ready for final inspection.
- II. This permit with the plans and specifications must be kept at the site of the work and made available to the Commissioner at any time during the construction.
- III. If any changes are contemplated or required, the Commissioner must be notified and supplementary approval obtained.
- IV. If the construction authorized by this permit is not started within one year of the date of this permit and completed within two years of the date, this permit must be renewed.
- V. Addition

INTERDEPARTMENT MESSAGE
STO-200

SAVE TIME: Handwritten messages are acceptable.
Use carbon if you really need a copy. If typewritten, ignore faint lines.

Vic

TO	John Spencer, Director	AGENCY	D. E. P.	DATE	Dec. 3, 1972
	Region 3				
FROM	Donald Grant, Manager	AGENCY	D. E. P.	TELEPHONE	526-2336
	Area 2				
SUBJECT	Gorton Pond Dam				

All the trees have been cut and removed from Gorton Pond dam in East Lyme as instructed in a memo received some time ago.

We need about 15 yards of gravel to fill in two low areas in the dam and a load of stone to face the new gravel with to complete this project.

The brush has also been cut and removed from the Moodus Reservoir dam. The trees and brush will be cut and removed from Bashan Lake dam this work period.

WATER & RELATED
RESOURCES
RECEIVED

DEC 13 1972

ANSWERED _____
REFERRED _____
FILED _____

SAVE TIME: If convenient, handwritten reply to sender on this same sheet.

John Spencer

Dept. of Environmental Protection

October 18, 1972

Region Manager

Victor F. Galgowski

Dept. of Environmental Protection

Supt. of Dam Maintenance

Gorton Pond Dam, East Lyme

At the request of Mr. Murphy, First Selectman, an on site inspection of Gorton Pond, located west of Route 161, East Lyme, was conducted on October 6, 1972 by the undersigned.

This dam did cause us some concern during the period of heavy rainfall last June. Although it is not in critical condition, the following maintenance work is in order whenever you can arrange to fit it into your schedule:

1. Remove all trees from the dam.
2. A low spot toward the east end of the dam (directly behind the fallen log) should be filled to grade.
3. The large stone that has become dislodged on the upstream face in this same area should be reset and a few more stones placed to protect the fill added.
4. The low area at the end of the dam should be graded toward the road.

At the present time we are not requesting any work be done on the spillway. It is our hope that a study of spillway capacity of all state owned dams will be initiated soon. If our findings indicate this spillway is inadequate, provisions will be made to redesign and rebuild it.

If you have any questions please contact me, otherwise let us know when the work is completed.

Supt. of Dam Maintenance

VFG:ljg

cc: Dennis Murphy

No. _____

WATER RESOURCES UNIT
SUPERVISION OF DAMS
INVENTORY DATA

Inventoried _____

By _____

Date _____

Lat: 41° 20.2'

Long: 72° 12.5'

Name of Dam or Pond GORTON POND

Code No. _____

Nearest Street Location Black Point Road; Route 161

Town East Lyme

U.S.G.S. Quad. Niantic

Name of Stream Pataquanset River

Owner STATE OF CONNECTICUT -DEP

Address _____ (Being redesigned by PWD)

Pond Used For _____ Drainage Area 6.49 sq.mi.

Dimensions of Pond: Width _____ Length _____ Area 50 ac.

Total Length of Dam 150' Length of Spillway 68'

Location of Spillway end

Height of Pond Above Stream Bed 8' - 2' = 6'

Height of Embankment Above Spillway 2'

Type of Spillway Construction 2' high cut stone onto stone bed

Type of Dike Construction stone face

Downstream Conditions pond, houses

Summary of File Data March 1963 Macchi: face deteriorating

Remarks trees - face stones displaced

Would Failure Cause Damage? possibly Class C

MACCHI & HOFFMAN • ENGINEERS

EXECUTIVE OFFICES • 44 GILLET STREET • HARTFORD, CONN., 06105 • PHONE (203) 525-6631

A. J. MACCHI, P.E.
H. R. HOFFMAN, P.E.
MICHAEL GIRARD

ASSOCIATE CONSULTANT
PROF. C. W. DUNHAM

STATE WATER RESOURCES
COMMISSION
RECEIVED

JUN 17 1971

June 15, 1971

ANSWERED _____

REFERRED _____

FILED _____

Water Resources Commission
State of Connecticut
165 Capitol Avenue
Hartford, Connecticut

Attention Mr. William H. O'Brien III


Re: Gorton Pond Dam
East Lyme, Conn.

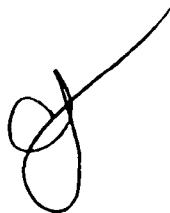
Dear Mr. O'Brien:

Reference is made to your letter of June 10, 1971 regarding the above. This dam was inspected by this office on June 1, 1971 and our report to your office of this inspection was dated June 3, 1971. The consequences of a failure of this dam could vary from the washout of a road immediately downstream of the dam, to damage to houses and structures downstream of the dam. Work required to place the dam in safe condition was discussed in our inspection report of June 3, 1971.

Very truly yours,

MACCHI & HOFFMAN, ENGINEERS


H. R. HOFFMAN, P.E.



MACCHI & HOFFMAN • ENGINEERS

EXECUTIVE OFFICES • 44 GILLETT STREET • HARTFORD, CONN., 06105 • PHONE (203) 525-6631

A. J. MACCHI, P.E.
H. R. HOFFMAN, P.E.
MICHAEL GIRARD

ASSOCIATE CONSULTANT
PROF. C. W. DUNHAM

June 3, 1971

Water Resources Commission
State Office Building
165 Capitol Avenue
Hartford, Connecticut

Attention Mr. William H. O'Brien III

Re: Gorton Pond
East Lyme, Conn.

Gentlemen:

In accordance with your letter of May 27, 1971 this office inspected the dam at Gorton Pond in East Lyme on June 1, 1971.

There has been one major change at the site since our last report of March 15, 1963, that being the removal of the New England Steam Gage Co. buildings at the east end of the dam abutting Conn. Route 161.

The stone fill recommended in the previous report has not been placed downstream of the dam and the two areas where the wall stones were displaced are still in existence.

Some preventive maintenance is also recommended which consists mainly of brush and tree removal. In the area of the earth fill dam, several 2 inch diameter bushes and a 10 inch tree near the east end should be removed from the downstream stone wall to prevent possible displacement of the stone wall. At the spillway, three clumps of 1 to 2 inch diameter brush should be removed from the upstream face and a 12 inch willow stump should be removed from below the downstream face.

STATE WATER RESOURCES
COMMISSION
RECEIVED

JUN 4 1971

ANSWERED _____
REFERRED _____
FILED _____

Very truly yours,

MACCHI & HOFFMAN, ENGINEERS



H. R. HOFFMAN, P.E.

DAM AT GORTON POND, EAST LYME

REPORT OF INSPECTION BY A. J. MACCHI, ENGINEERS

ON MARCH 15, 1963

This pond is located on the Patagansett River about one mile north of the town of Niantic adjacent and west of Route 161. The dam consists of a vertical stone wall approximately 9 feet high on the downstream face, backed up by earth fill. The dam section is approximately 112 feet long and the spillway section which is approximately 62' long and is adequate. The watershed area of this pond is approximately 4,300 acres. At one time the water stored was used for industrial purposes, however, the drawdown has been silted up and is no longer utilized. The New England Steam Gage Company occupies the building at the dam site on Route 161, and there are many houses downstream.

There are several areas where the wall stones have been pushed out of alignment by freeze thaw cycles, and in one location this displacement is approximately 4 feet. Unless this situation is corrected before next winter, further progressive displacement will take place due to freezing and thawing and could lead to failure of the dam.

It is suggested that this situation be permanently repaired by dumping loose stones on the downstream side of the wall at a stable slope (maximum 1:1). This will give frost protection and stabilize the downstream face of the wall.

APPENDIX B-2

AVAILABLE ENGINEERING DATA

MACCHI ENGINEERS

EXECUTIVE OFFICES

44 GILLETT STREET

HARTFORD, CONN., 06105

PHONE (203) 549-6190

A. J. MACCHI, P.E.
MICHAEL GIRARD, P.E.

ASSOCIATE CONSULTANT
PROF. C. W. DUNHAM

December 6, 1976

State of Connecticut
Dept. of Environmental Protection
Fish and Water Life Division
State Office Building
Hartford, Conn. 06115

Attn: Mr. Richard Haynes

East
Re: Gorton Pond-Old Lyme, Ct.
Leaks under spillway

Dear Mr. Haynes:

In accordance with our inspection and ensuing conversation, herewith is an outline of procedures to be used at upstream face of dam to correct leakage problem under spillway.

1. Drawdown pond level to below slope, 20' out from face of spillway.

2. Remove muck down to a clean inorganic base. Thickness of material to be removed will probably vary from 0' at toe of apron to 12" - out 20'.

3. Plug all channel holes in rock-work of dam using a graded gravel. Where it is obvious that channels have been eroded at toe of apron, remove some of the stones to allow deeper filling of channels a minimum of 12" to 18". This gravel or crushed stone should be coarse enough to plug holes of approximate following gradation:

- 100% passing 3/4" sieve
- 60-80% passing 3/8" sieve
- 10-20% passing #4 sieve
- 0 -5% passing #100 sieve

After channels have been plugged, fill rock crevice of slope of dam to form a uniform flat surface over entire area.

4. On top of face of dam slope, apply a blanket of coarse sand about 6" - 8" thick. Grading of sand to be approximately as follows:

100% passing 3/8 screen
40-80% passing #4
10-20% passing #50
0-10% passing #100

5. After placing sand blanket, place 12" - 15" of silty clay over entire area. This clay blanket is to overlap spillway face to within 12" + or - from top.

6. On top of clay blanket, place a protective blanket of 6" sand topped over with coarse gravel 2" - 3" in size to top of spillway face.

7. Feather all material blankets into pond area at edges.

This corrective work should be applied on the upstream face of the dam from the drawdown structure, west to the spillway and adjacent earth embankment. The plugging of water channels and placing of impervious and protective blankets should reduce leaking to a minimum. However, over a period of time, water action may shift some of these materials around and again etch another channel causing reoccurring leaks. Pressure grouting with grout is more permanent, but much more costly and in my opinion unwarranted, for the low head dam involved.

Very truly yours,

MACCHI ENGINEERS

A. John Macchi

AJM/lp

Enclosed add from Engineering Magazine. This fabric can probably be effective in maintaining clay blanket in place used on top of the sand blanket.

SPECIFICATIONS

FOR

GORTON POND DAM REPAIR
EAST LYME, CONNECTICUT
PROJECT BI-BB-82

MACCHI & HOFFMAN, ENGINEERS
44 GILLET STREET
HARTFORD, CONNECTICUT 06105

Applicable provisions of the General Conditions and Division I - General Requirements shall govern work under this Division.

2.01 WORK INCLUDED

- a. This Contract includes all labor, tools and materials to complete all work as defined on the drawings and hereinafter specified. The following shall be taken as a general outline and not a complete or specific list. It shall be considered as being supplemented by subsequent Specifications and Contract Drawings.

- | | |
|---------------------|--------------|
| A. Demolition | E. Handrails |
| B. Earthwork | |
| C. Grassed Areas | |
| D. Chain Link Fence | |

2.02 DEMOLITION

a. Drawdown of Pond

Contractor shall drawdown the pond by breeching the dam near the center of the structure where the new drawdown structure will be built. Extreme caution shall be used to control the flow of water at all times, so that the capacity of the downstream waterway opening of the Roxbury Bridge (see Site Plan) the Bush Pond spillways and other culverts are not exceeded. No headwater shall be allowed to build up at any culvert. The Contractor shall save the State harmless from any damages which may result from an excessive rate of drawdown.

b. Plugging Existing Intake Structure

At the east end of the dam there is an old intake structure consisting of a concrete end wall and a pipe under the dam. The pipe will be concrete plugged to the satisfaction of the Owner.

c. Removal of Existing Spillway and Portions of the Dam

The construction of the new spillway and new drawdown structure will require demolition of present spillway and portions of the dam.

GORTON POND DAM REPAIR
EAST LYME, CONN.
PROJECT BI-BB-82

2.03 EARTHWORK

a. Clearing and Grubbing

Within the construction limits all trees, tree stumps, debris and brush shall be removed. Within the area of channel improvement the Owner shall direct the Contractor as to the large size trees that could remain. All other trees and brush shall be removed and disposed of, digging out stumps to a depth of 24 inches and the hole filled with coarse fill and compacted in twelve (12) inch layers.

b. Removal of Topsoil

Topsoil shall be stripped from all areas affected by construction and stockpiled for future use.

c. Excavation

1. Excavation shall consist of the removal and disposal of all materials, including boulders and rock, to the proper level below finish grades as shown on the plans. Excavated material shall be used as fill if it meets the requirements for fill in these specifications. All excavated materials not suitable or not used for fill shall be completely removed from the site.
2. Excavation of boulders forming the existing dam and spillway will not be paid as rock excavation regardless of their size.

d. Backfill

Backfill in general shall be of excavated material with all vegetable matter or other material subject to decay carefully removed. It shall be thoroughly compacted by vibratory compactors and shall be regraded where settlement occurs. Care shall be taken to avoid damaging completed work with equipment used in backfilling. All areas not reached by equipment shall be hand tamped to equal compaction. Material shall conform to the requirements of Section M.02.07, Grading B, of the Standard Specifications of the Connecticut State Highway Department.

- e. Shoring - Provide shoring, sheeting, bracing, as required subject to the approval of the State.
- f. Embankment Construction - Existing dam and spillway are to be modified as follows:

GORTON POND DAM REPAIR
EAST LYME, CONN.
PROJECT BI-BB-82

EARTHWORK (Continued)

1. Reconstruction of Dam Around New Drawdown Structure

- i. After the construction of the main concrete portion of the drawdown structure, contractor shall rebuild the excess removed portion of the existing dam to match the present structure providing an impermeable clay core in its central portion not less than 3 feet thick extending down to the lowest footing elevation.
- ii. All backfill shall be thoroughly compacted by vibratory compactors to reach a minimum 98% Modified Proctor Compaction.

2. Downstream Face

- i. After clearing and grubbing, Standard Riprap shall be placed as shown in the plans. Standard Riprap shall consist of sound, tough, durable and angular rock, free from decomposed stone or other defects impairing its durability. All stones shall have no dimension less than 6 inches and shall weigh not less than 50 pounds, not more than 1000 pounds and at least 75% of the mass shall be stones weighing more than 150 pounds. Voids will be filled in with smaller stones and spalls. Riprap may be dumped over the area until the required slope is attained.
- ii. Contractor shall grade roughly the area downstream where riprap will be placed. This may be done in steps at different levels. This is so that the stone will not have a tendency to slide after being placed. Before dumping the riprap, the Contractor shall review overall conditions and assure himself that there are no loose stones in the existing embankment that might prove hazardous during construction operations.
- iii. The riprap outline at the spillway embankment must have a proper finish to allow the placing of the concrete revetment.

3. Upstream Face

- a. At the dam excavate area to provide an intermediate riprap protection as shown in plans. Intermediate riprap shall consist of sound, tough, durable, and angular rock, free from decomposed stone or other defects impairing its durability. All stones shall have no dimension less than 6 inches and shall weigh not less than 50 pounds not more than 500 pounds

GORTON POND DAM REPAIR
EAST LYME, CONN.
PROJECT BI-BB-82

2.03 EARTHWORK (Continued)

- a. and at least 75% of the mass shall be stones weighing more than 150 pounds. The stones will have only a nominal quantity of scattered spalls. Rearranging of individual stones by mechanical or hand methods will be required to the extent necessary to obtain a reasonably well protected and uniform surface.
- b. At the spillway excavate area to provide the placement of the concrete revestment and an impervious clay blanket as shown in the plans. In front of the spillway, all area disturbed by excavation will be covered by a minimum 12" blanket of compacted clay to the limits and slopes shown in the plans.

4. Top of Dam

The top of the dam shall be provided with an Intermediate Riprap protection as shown in the plans. The riprap shall be placed to its full thickness in one operation. Rearranging of individual stones by mechanical or hand methods will be required to the extent necessary to obtain well graded distribution of the stone sizes. Once the larger stones have been properly arranged the Contractor shall spread a light blanket of trap rock or approved spalls to produce a reasonably smooth walking surface.

g. Channels Protection

The stream channel shall also have riprap protection at the inlet and outlet of the drawdown structure, at the toe of the dam and spillway and at the west embankment of the channel, as shown in the plans. The stones will, in this case, have only a nominal quantity of scattered spalls.

h. Drainage

Proper drainage shall be maintained by the Contractor at all times during construction to prevent unnecessary washing and depositing of materials. Special care shall be exercised to prevent damage to adjacent land and contractor shall correct any damage at no expense to the State.

2.04 GRASSED AREAS

Provide loam and seed in areas designated on the drawings or disturbed by construction operations.

1. Areas on the plan to be loamed and seeded shall be covered with (4) four inches of topsoil possessing characteristics of representative productive soil in the vicinity and shall be reasonably free of clay lumps, stones and roots. The following shall be added to and mixed with the topsoil: ground limestone, 100 pounds per 1,000 S.F. and commercial fertilizer (10-10-10) 20 pounds per 1,000 S.F. Grass seed shall be sown at the rate of two (2) pounds per 1,000 S.F. Seeded areas shall be lightly raked and rolled and covered with a hay mulch to prevent washing. All areas that do not show a prompt catch shall be reseeded at ten-day intervals until growth is established. Grass seed shall consist of the following mixture: Creeping Red Fescue (45%), Kentucky Blue Grass (40%) Rye Grass (10%) and Alsike Clover (5%).

The planting season shall be from April 15 to June 1, and August 15 to October 15.

2. Maintenance

Seeded areas shall be mowed at least twice and maintained by the Contractor, until a stand of grass at least 3" high over the entire area is obtained to the satisfaction of the State.

2.05 CHAIN LINK FENCE

- a. The Contractor shall furnish and install 6 feet high chain link fences as shown on plans. Material to be as sold by Anchor Fence Co., Cyclone Fence Co., or approved equal.
- b. Fabric to be No. 9 gauge, aluminum-coated, 2" x 2" mesh conforming to ASTM Specifications A-491-63T., Line posts, not further than 10 feet apart, to be galvanized, H type with minimum section 1-7/8" x 1-5/8" x 2.72 lbs. and tensile strength not less than 80,000 lbs per sq. inch. End posts shall be galvanized,

GORTON POND DAM REPAIR
EAST LYME, CONN.
PROJECY BI-BB-82

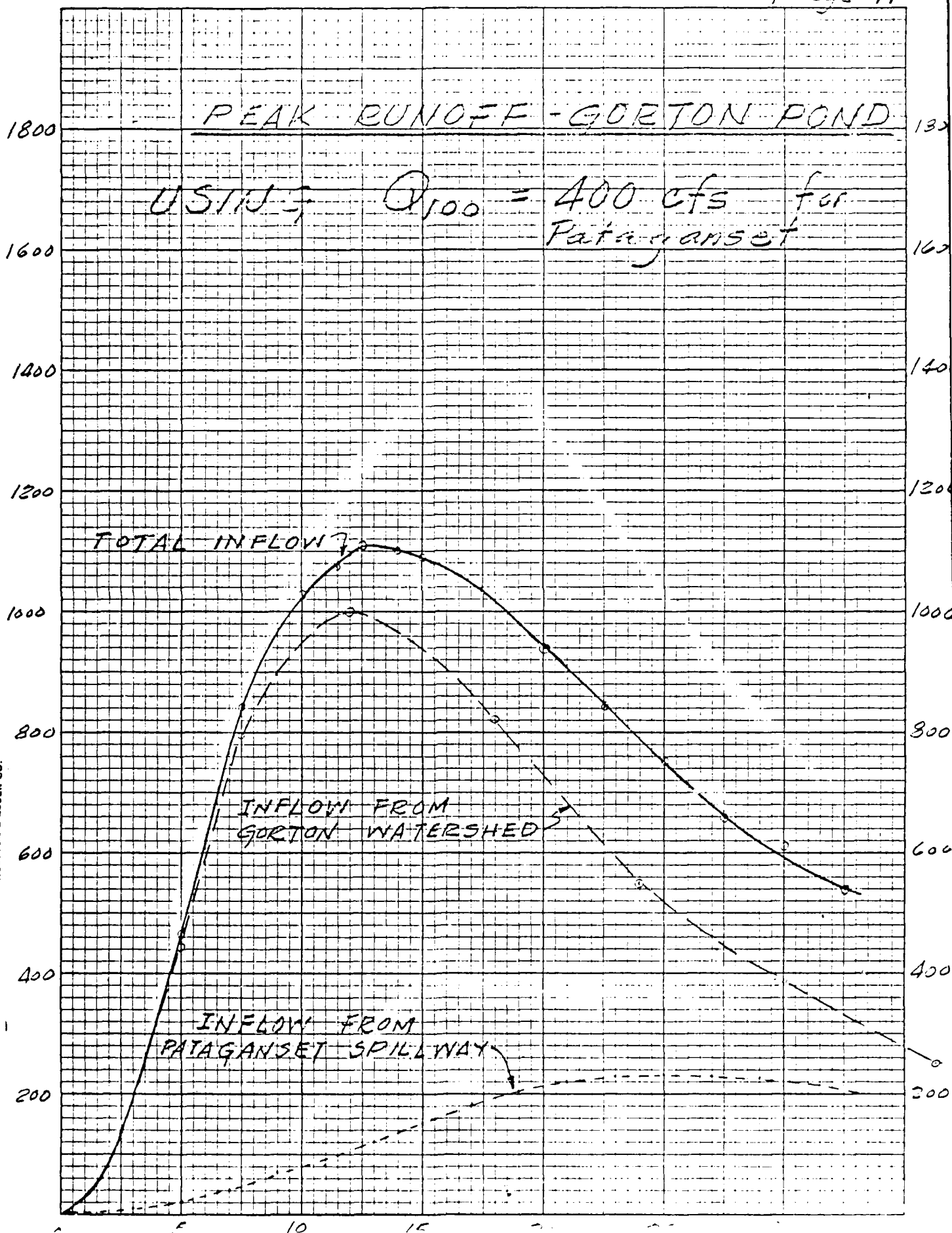
2.05 CHAIN LINK FENCE (Continued)

3-1/2" x 3-1/2" x 5.14 lbs. roll formed sections or approved equal. Top rail shall be galvanized tubular steel 1-5/8" O.D. or weighing not less than 2.27 #/L.F. or approved equal.

- c. All posts shall be set 3'-0" in 2000 PSI concrete footings, 15" in diameter, to extend from 3" above ground to 4" below bottom of posts.

2.06 HANDRAILS

- a. The Contractor shall furnish and install handrails as shown on plans.
- b. Railing shall be 1½" inside diameter extra strong steel pipe with required fittings, conforming to ASTM Standards for A-36 steel, hot dip galvanized conforming to ASTM A-386. All construction shall be welded with joints ground smooth. Set handrails in pipe sleeves with Leadite or approved equal.
- c. A 36" wide 2" mesh, #11 gage aluminum-coated steel fabric shall be attached to the railings by means of #11 gage coil spring wire ties at 18" on center, at posts and top and low rail. If so ordered by the Engineer the fabric may be attached to the railing by tack welding.



BY JHC, DATE 7-31-73

SUBJECT

GORTON POND

SHEET NO. 12 OF

CHKD. BY _____ DATE _____

JOB NO. _____

GORTON POND - SPILLWAY DESIGN

From Peak Runoff Diagram for Gorton Pond

$$Q_{max} = 1110 \text{ cfs.}$$

$$Q = CLH^{3/2} \quad \text{--- Make } H = 18'' = 1.5'$$

$$1110 = 3 \cdot L \cdot (1.5)^{3/2}$$

$$= 3 \cdot L \cdot 1.837$$

$$L = \frac{1110}{3 \cdot 1.837} = 201$$

For $Q = 1110 \text{ cfs}$ and $L = 112 + 62 = 174'$

$$1110 = 3 \cdot 174 \cdot H^{3/2}$$

$$H^{3/2} = 2.126 \rightarrow H = 1.65'$$

If we make $L = 62' \rightarrow H_1 = 1'$

$$Q_1 = 3 \cdot 62 \cdot 1^{3/2} = 186 \text{ cfs}$$

$$Q_2 = 1110 - 186 = 924 \text{ cfs}$$

$$H_2^{3/2} = \frac{924}{3 \cdot 174} = 1.770 \rightarrow H_2 = 1.46'$$

This means that during high floods the pond's discharge will overtop the dam with an approximated head of 1.5 ft.

August 16, 1973

Jose H. Cosio, P.E.
Chief Engineer
Macchi and Hoffman Engineers
44 Gillett Street
Hartford, Connecticut 06105

Re: Design Discharge from
Gorton Pond

Dear Mr. Cosio:

For comparative purposes, I used a formula developed by Marvel A. Benson, which is presented in USGS Paper 1580-B, to calculate a flood flow for this area. This formula yielded a 100-year discharge of 2,250 cfs. This equation does not reflect the dampening of the peak discharge by the storage present in each pond, and therefore is not entirely applicable. I feel your discharge of 1,110 cfs should be a reasonable estimate to use for the redesign of the spillway.

I visited the site on August 3, 1973, and spoke to a Mr. Erving Marie at 9 Rocksbury Road, Niantic, who owns the cottage and other property at the west end of the dam. He mentioned that the pond has never reached the level of the road, including 1955. In 1955 the water rose up to the level of floor of the cottage at the west abutment. I would guess to produce this water surface elevation, a flow of about 1,100 cfs would have to occur, although I do not have survey data to base this estimate on.

The approach you have suggested, i.e., building a spillway at the level of the old spillway, but which extends across through what is currently the dike section, sounds like a reasonable approach to the problem. You may disregard my comments concerning the use of flashboards, as I would prefer not to use them unless absolutely necessary.

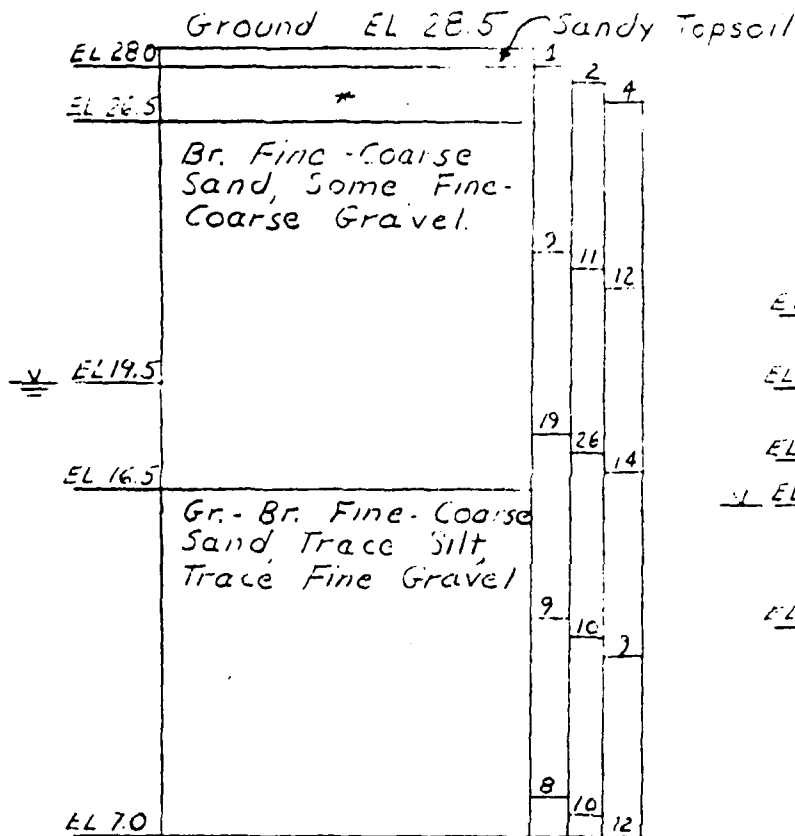
Sincerely,

Joseph O. Elmer
Senior Civil Engineer
Water and Related Resources

JOE:n

BORING DATA

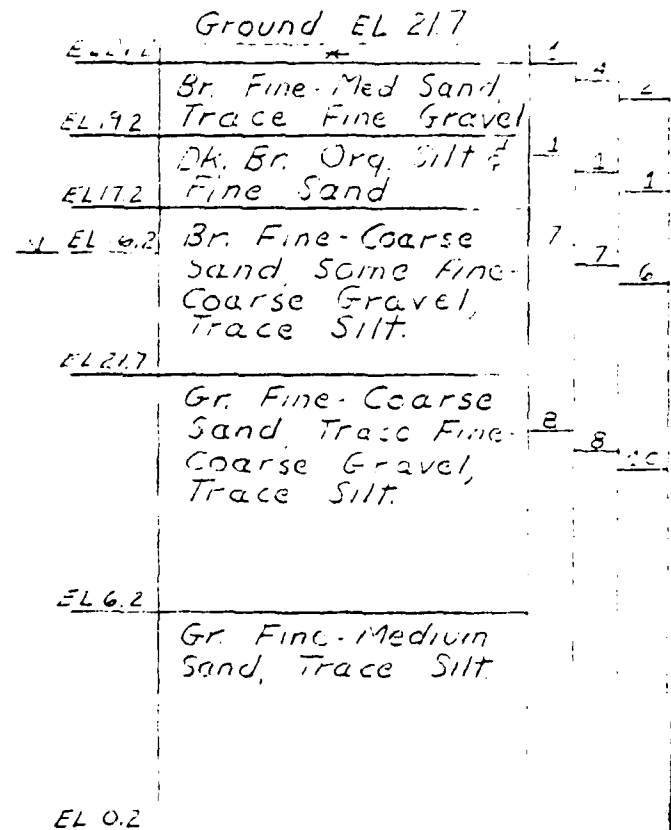
1



* Br Fine-Med Sand,
Trace Fine-Med.
Gravel

And: 40-50%
Some: 10 40%
Trace: 0-10%

2



DRAWING TITLE

CROSS-SECTIONS

STATE OF CONNECTICUT
PUBLIC WORKS DEPARTMENT

PAUL J. MANAFORT

COMMISSIONER

DRAWN BY

P. L.

DATE

9-13-73

CHECKED BY

H. B. W.

DATE

11-11-73

APPROVED BY

J. H. C.

DATE

11-20-73

AS-BUILT BY

DATE

PROJECT TITLE

GORTON POND
DAM REPAIR

EAST LYME

CONNECTICUT

PROJECT NUMBER

RI-88-92

SCALE

SHO

DRAWN

OF

APPENDIX B-3

PLANS, SECTIONS AND DETAILS



GORTON POND

ABANDONED
INTAKE

SPILLWAY
CREST

DRAWDOWN
STRUCTURE

SEEPAGE

ABANDONED
OUTLET

SEEPAGE

PATAGUANSET
RIVER

PLAN

NOT TO SCALE

FLANDERS ROAD

GORTON POND DAM

GENERAL PLAN

[illegible]

24-2

4.4

64.0

24.6

Spring #1

7.8

7.8

7.8

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7.8

7.8

LEGEND

[Symbol] Existing

[Symbol] Proposed

[Symbol] Construction

[Symbol] (Construction n.t.s.)

APPROXIMATE
DRAINAGE LINE

Spring #1

at bottom of
EL 275

EL 275

Construction

1-9

(B)

pond

196

1967 100 100 100 100

10.00

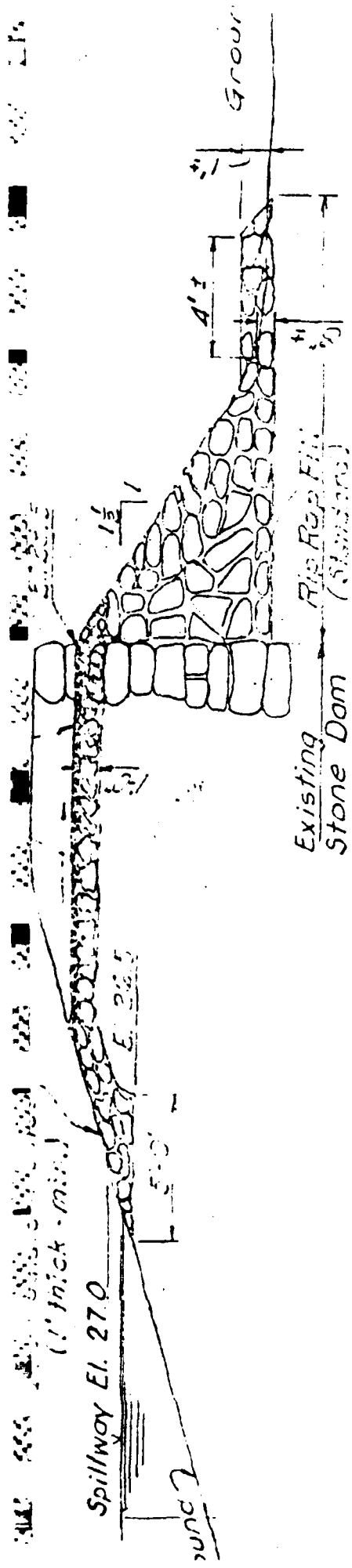
1967 100 100 100 100

3

STATE OF CONNECTICUT	
DEPARTMENT OF CONSTRUCTION	
BUREAU OF HIGHWAYS	
GORTON FOND	
DAM REPAIR	
PART 1 - CONSTRUCTION	
BIBB-R2	
PLANS PREPARED BY	

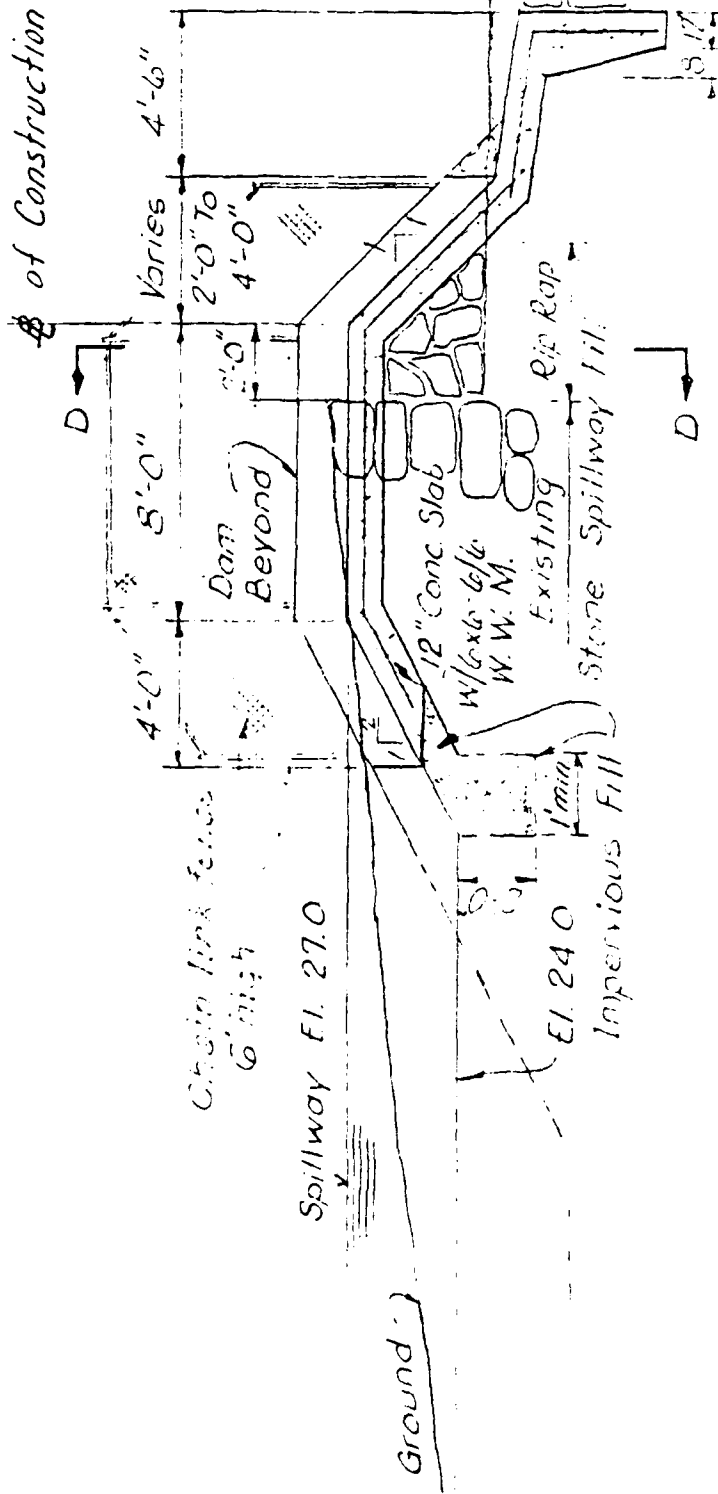
2

4



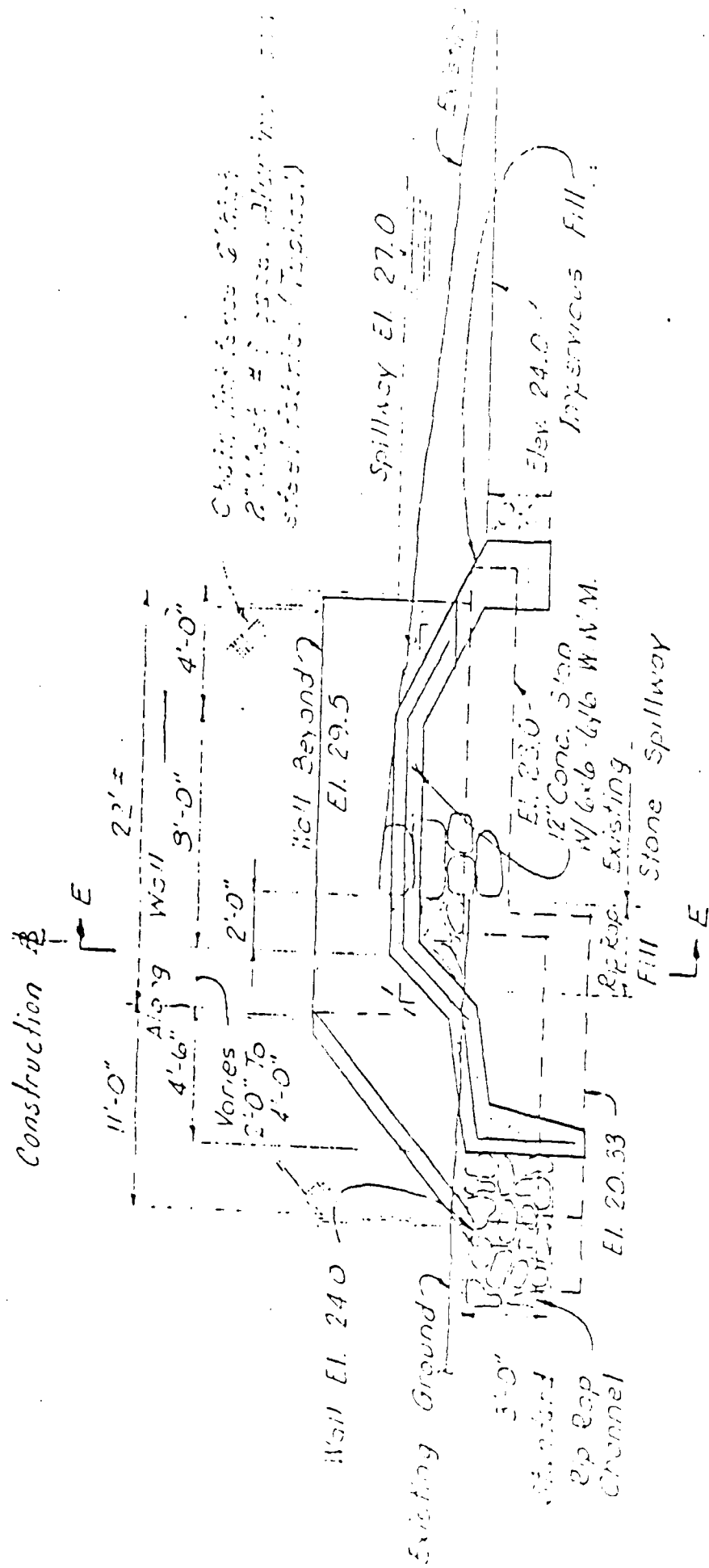
SECTION A-A

SCALE 1" = 5'-0"



SECTION B-B

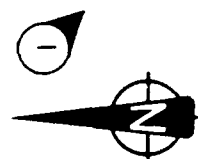
SCALE 1" = 5'-0"



SECTION C-C

APPENDIX C

PHOTOGRAPHS



GORTON POND

ABANDONED
INTAKE

DRAWDOWN
STRUCTURE

SPILLWAY
CREST

ABANDONED
OUTLET

SEEPAGE

SEEPAGE

PATAGUANSET
RIVER

PLAN

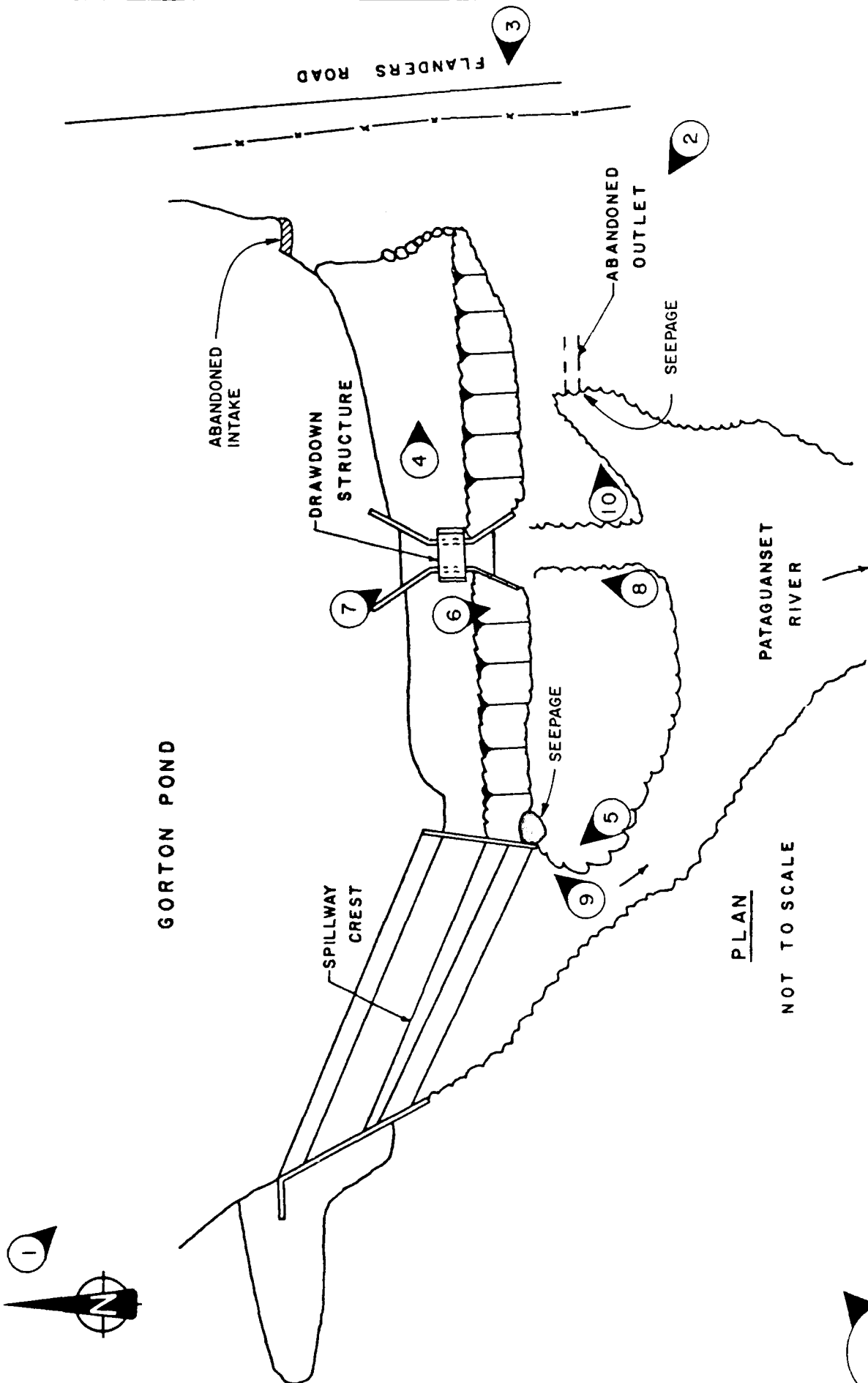
NOT TO SCALE

FLANDERS ROAD

GORTON POND DAM

PHOTO INDEX

OVERVIEW



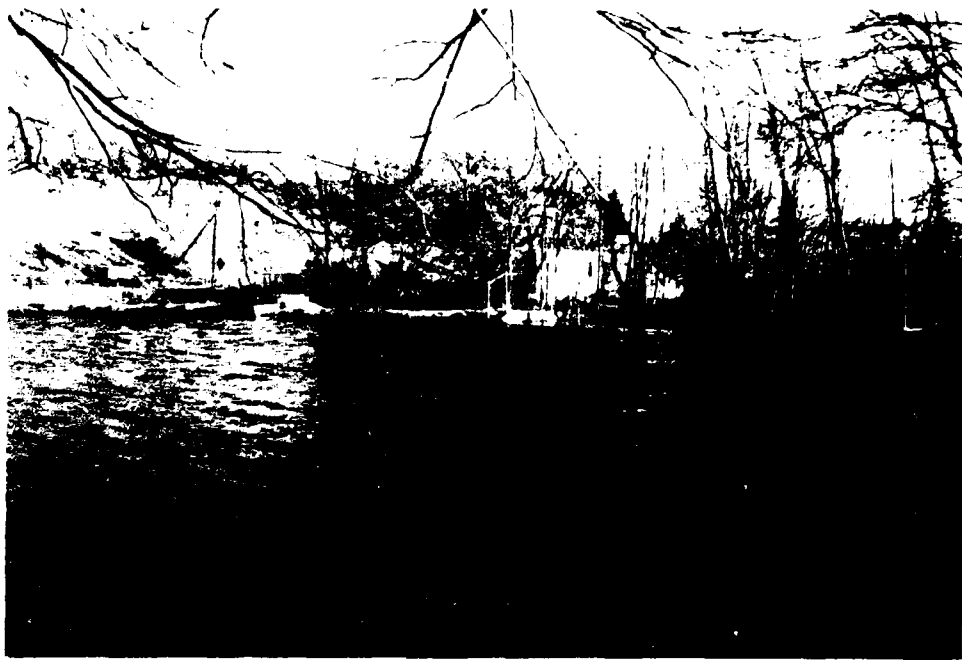


PHOTO C-1: Upstream face of dam from right side.



PHOTO C-2: Downstream face of dam from left side.



PHOTO C-3: Embankment, outlet structure and spillway from left side.



PHOTO C-4: Embankment crest and left abutment.

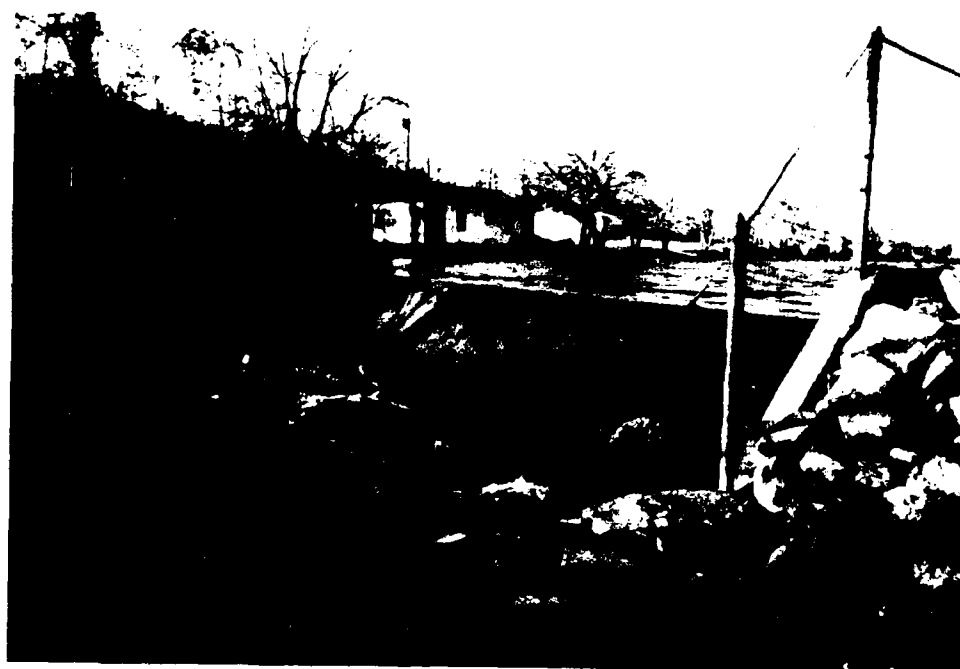


PHOTO C-5: Spillway from left side.



PHOTO C-6: Downstream channel from embankment.

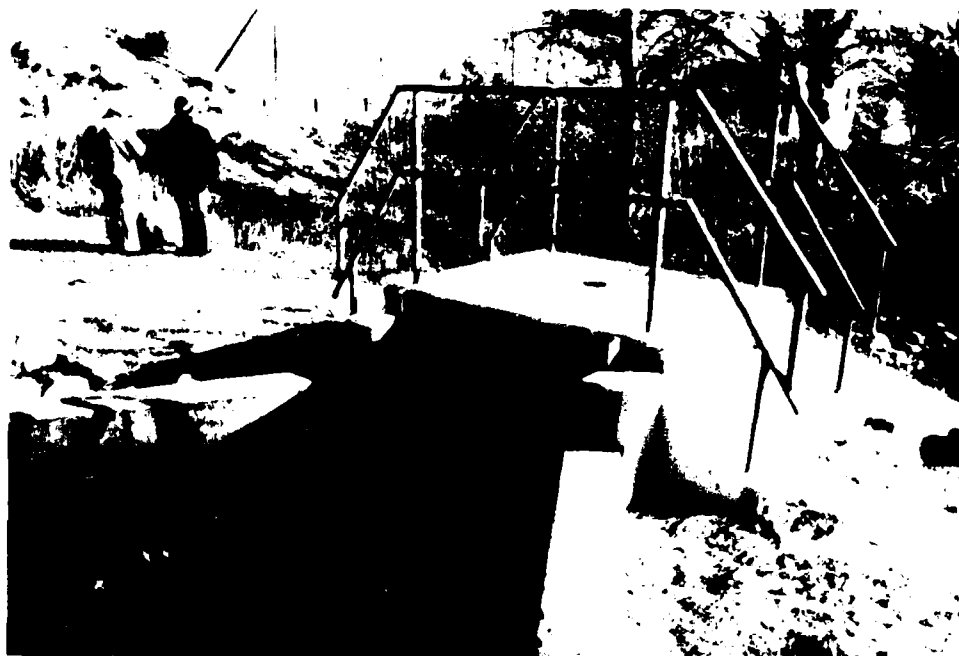


PHOTO C-7: Outlet structure from upstream.

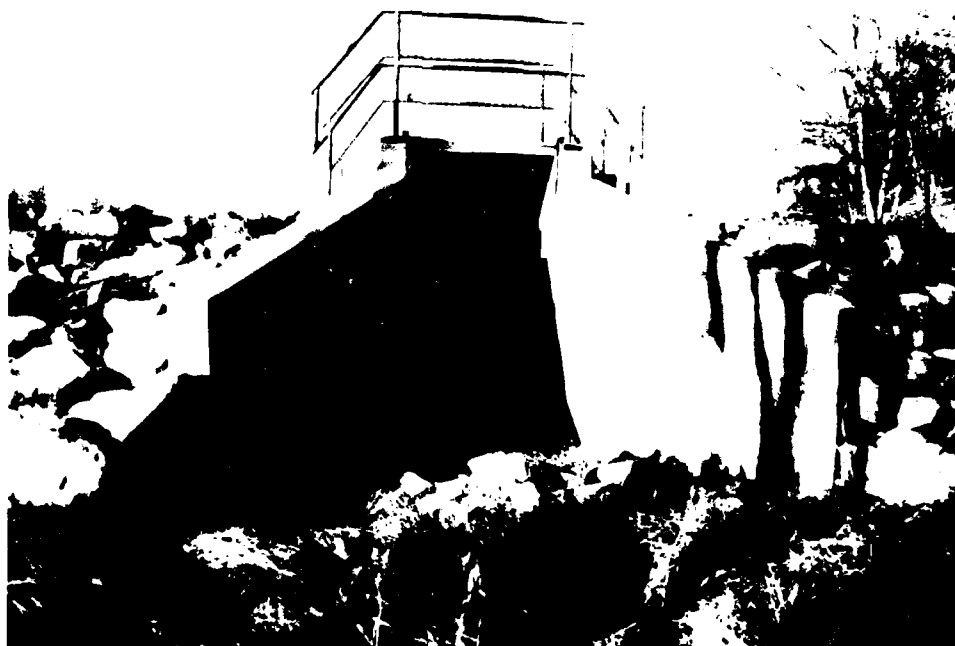


PHOTO C-8: Outlet structure from downstream.



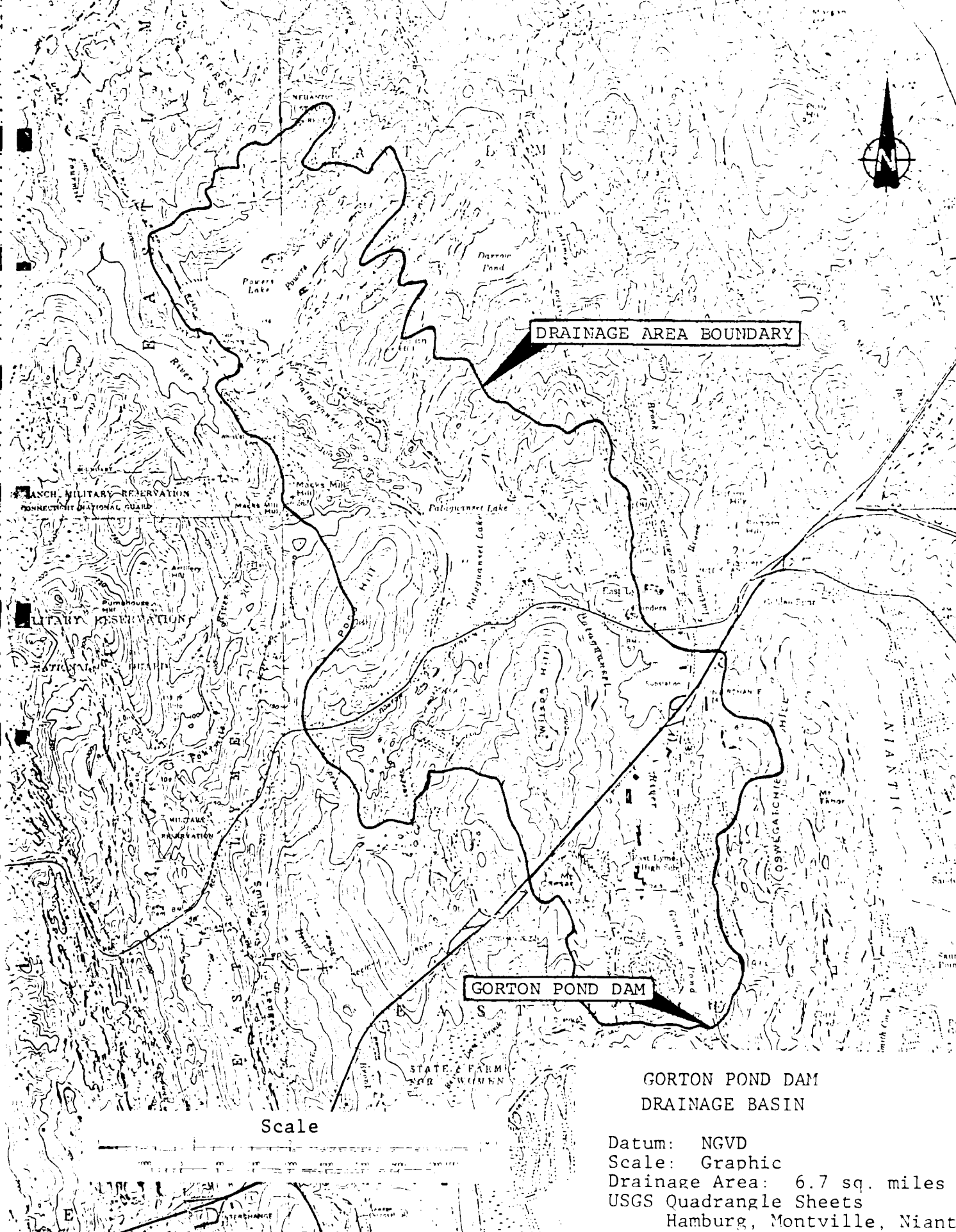
PHOTO C-9: Joint separation and seepage at left spillway training wall.



PHOTO C-10: Abandoned outlet and apparent seepage.

APPENDIX D

HYDROLOGIC & HYDRAULIC COMPUTATIONS



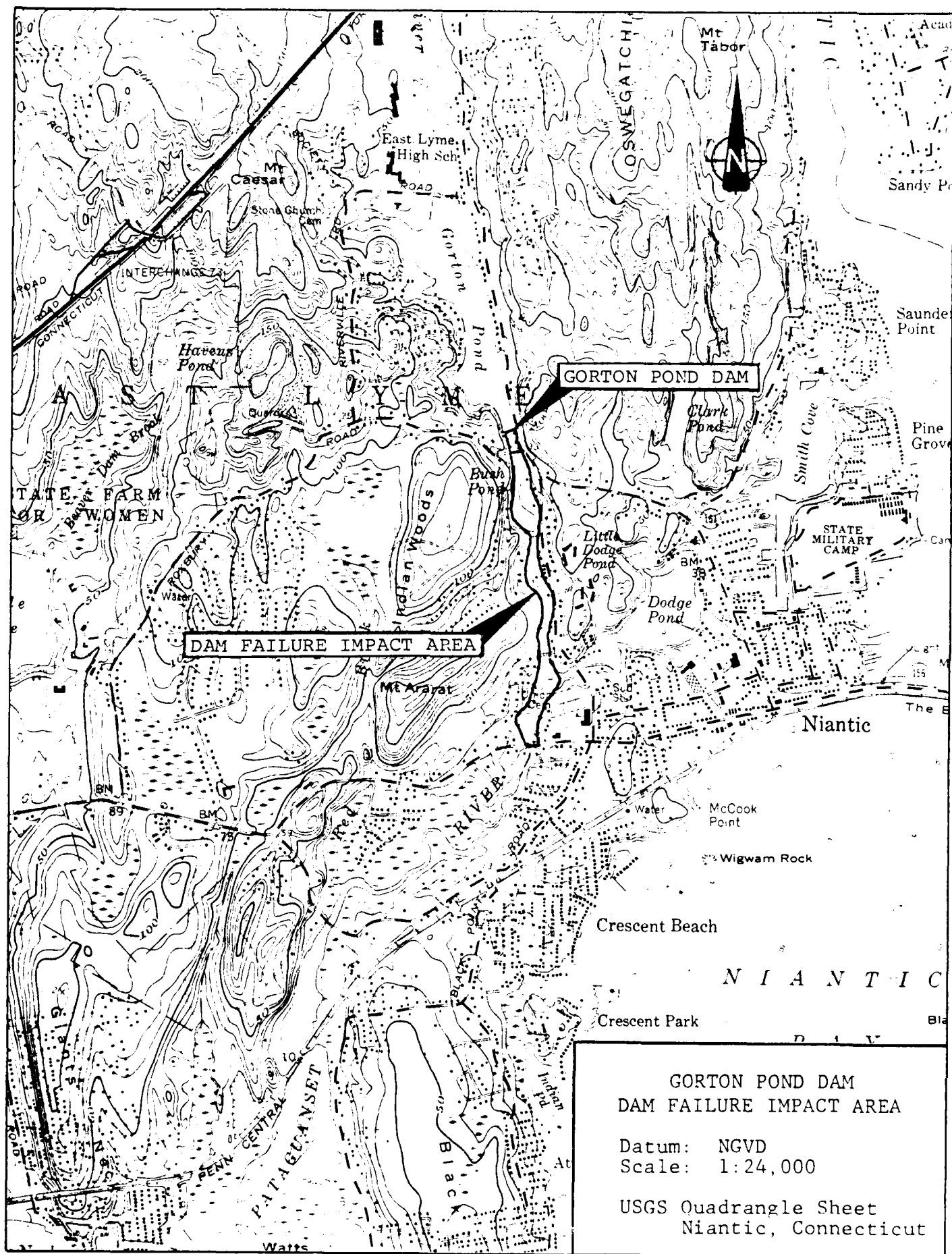
DRAINAGE AREA BOUNDARY

GORTON POND DAM

GORTON POND DAM
DRAINAGE BASIN

Scale

Datum: NGVD
Scale: Graphic
Drainage Area: 6.7 sq. miles
USGS Quadrangle Sheets
Hamburg, Montville, Niantic
& Old Lyme, Connecticut



Job No. 80101Project DAM INSPECTION - GORDON FARM DAMSubject HUBBARD RIVER HUBBARDVILLESheet 1 of 13Date 11/81By DS Ch'k. by DSBASIC DATA

DRAINAGE AREA = 6.7 SQ. MI.
NORMAL POOL ELEV. = 27.0 NGVD
MAX POOL ELEV. = 28.5 NGVD

RESERVOIR :

@ NORMAL POOL ELEV. - AREA = 55 AC STORAGE = 450 AC-FT
@ MAX POOL ELEV. - AREA = 78 AC STORAGE = 540 AC-FT

DAM: EARTHFILL

MAX HEIGHT = 10.0'
MAX LENGTH = 225'

SPILLWAY: CONCRETE OGEE

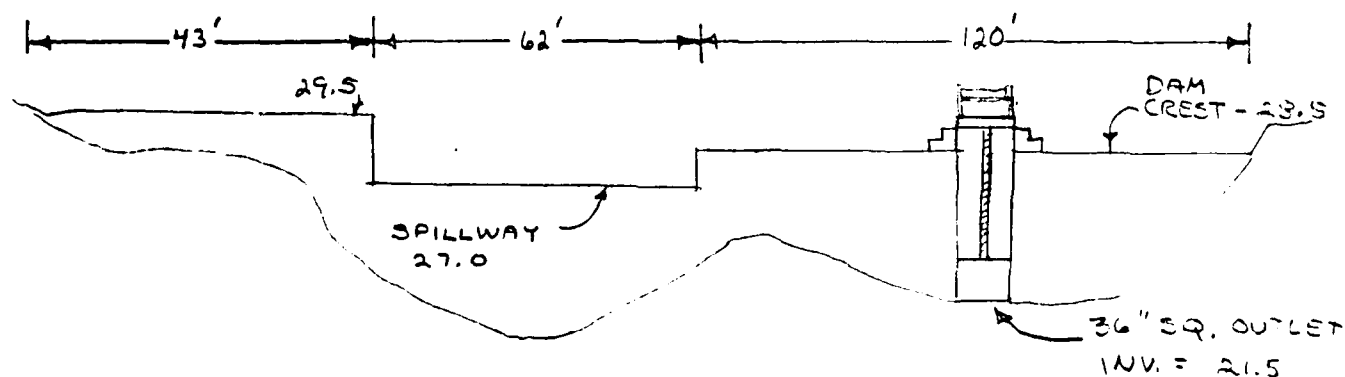
ELEVATION = 27.0 NGVD
LENGTH = 62.0'

OUTLET: 36" SQUARE CONC. OPENING W/STEEL GATE

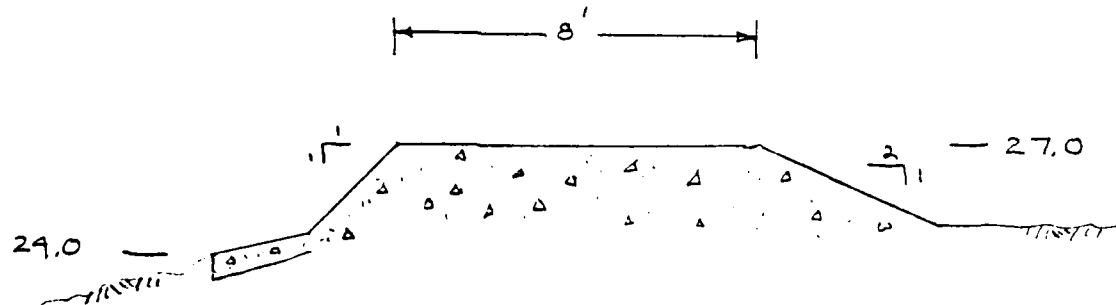
CLASSIFICATION

SIZE: SMALL

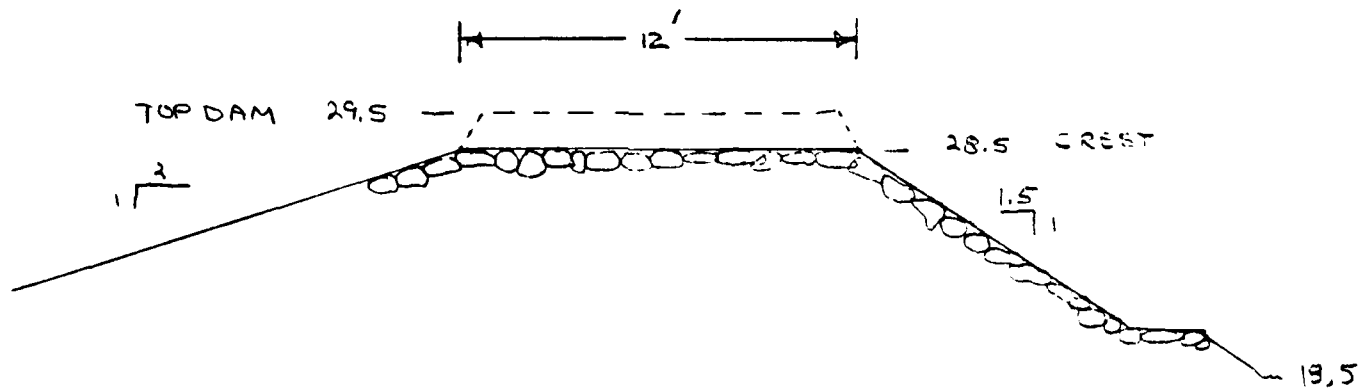
HAZZARD: SIGNIFICANT

LONGITUDINAL SECTION ALONG DAM - LOOKING UPSTREAM

Job No. 90101 Sheet 3 of 13
 Project DEM INSPECTION - GORTON DAM DAM Date 1/8/8
 Subject _____ By C Ch'k. by JME



SPILLWAY SECTION



DAM SECTION - STA 0+60

Job No. 80101Project DAM INSPECTION - GORTON POND DAM

Subject _____

Sheet 3 of 13Date 1/5/81

By _____ Ch'k. by _____

CALCULATE SPILLWAY DESIGN FLOODCLASS. : SIZE: SMALL
HAZARD: SIGNIFICANTUSE: 1/2 PMF AS TEST FLOOD

FROM MPF PEAK FLOW RATES FOR ROLLING TOPOGRAPHY, DA = 4.7 SQ MI

PMF = 1750 CSM

REDUCE BY 20% FOR LAKES AND PONDS

PMF = .8 X 1750 = 1400

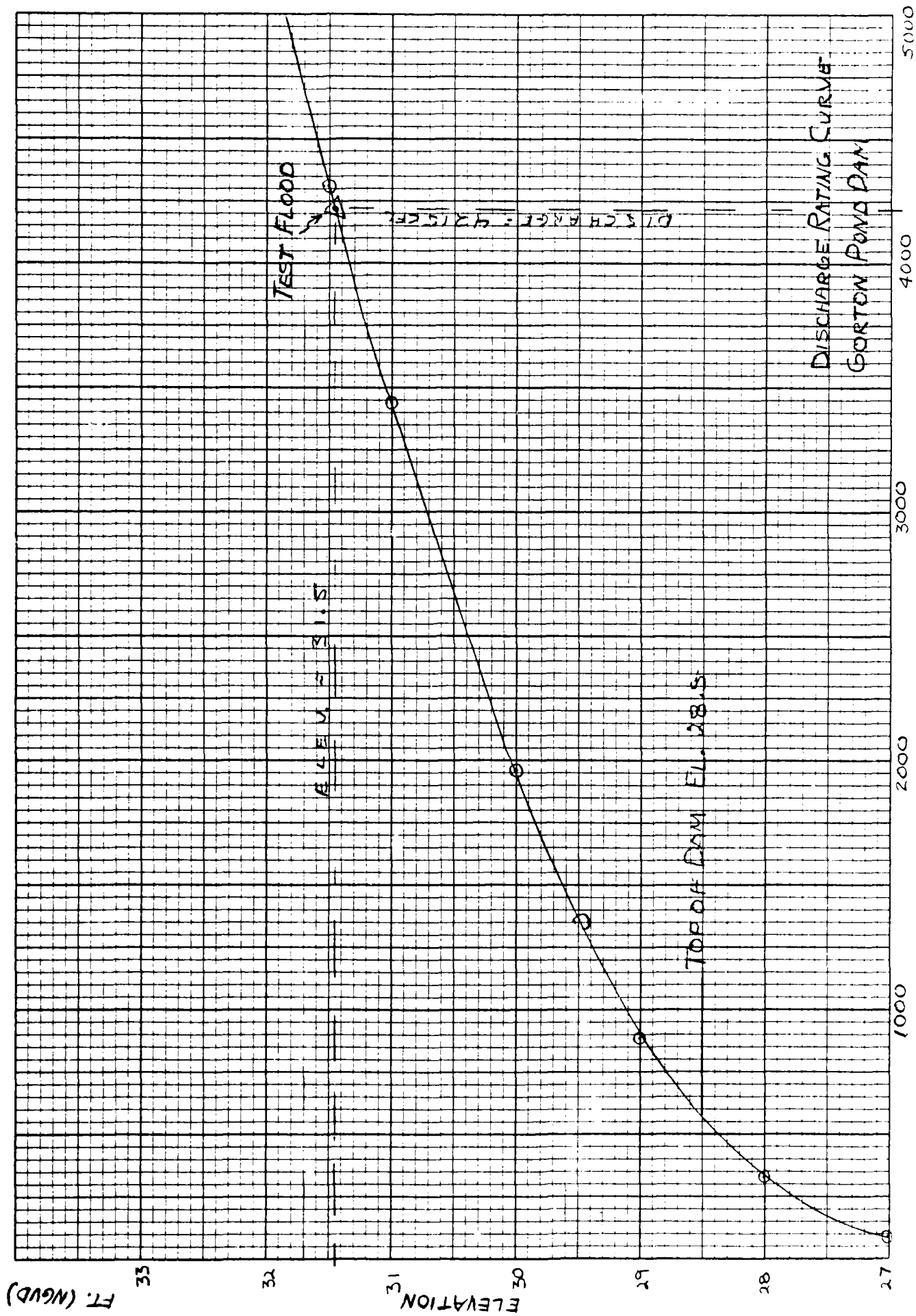
TEST FLOOD = 1/2 PMF = 700 CSM

= 4700 CFS IN FLOWCALCULATE TEST FLOOD SURCHARGE

TEST FLOOD = 4700 CFS

SPILLWAY AND DAM DISCHARGE = $CLH^{3/2}$ $C_{DAM} = 2.6$ (BROADCRESTED WEIR) $L_{CREST} = 120'$ $L_{TOP} = 43'$ $C_{SPILLWAY} = 3.8$ (OGEE WEIR) $L = 62'$ OUTLET DISCHARGE = $CA\sqrt{2gh}$ $C_{OUTLET} = 0.6$ (SQUARE ORIFICE)NO TAILWATER INFLUENCE IS ASSUMED, h IS MEASURED FROM THE E OF THE ORIFICE = 23.0 NGVD

WS ELEV.	H _{SPILL}	Q _{SPILL}	H _{CREST}	Q _{CREST}	H _{DAM}	Q _{DAM}	H _{OUTLET}	Q _{OUT}	Q _{TOTAL}
27.0	0	0	0	0	0	0	4.0	87	87
28.0	1.0	235	0	0	0	0	5.0	97	332
29.0	2.0	665	.5	110	0	0	6.0	106	881
30.0	3.0	1224	1.5	573	0.5	40	7.0	115	1952
31.0	4.0	1884	2.5	1233	1.5	205	8.0	123	3445
32.0	5.0	2634	3.5	2043	2.5	442	9.0	130	5250



Job No. B0101 Sheet 5 of 13
 Project DAM INSPECTION - GARDNER DAM, TOWN Date 1/5/91
 Subject _____ By SE Ch'k. by _____

CALCULATE EFFECT OF SURCHARGE STORAGE

PEAK INFLOW = 4700 CFS ; SURCHARGE HEIGHT = 4.7'

$$\text{SURCHARGE VOLUME} = \frac{55\text{AC} + 98\text{AC}}{2} \times 4.7 = 360 \text{ AC-FT}$$

$$\text{STOR}_1 = \frac{360 \text{ AC-FT} \times 12}{6.7 \times 640} = 1.01 \text{ in}$$

$$Q_{P1} = 4700 \left(1 - \frac{1.01}{9.5}\right) = 4200 \text{ CFS}$$

$$\text{SURCHARGE @ 4200 CFS} = 4.45 \text{ FT}$$

$$\text{STOR}_2 = \frac{4.45 \times 76.0 \times 12}{6.7 \times 640} = .95$$

$$\text{STOR}_{\text{AVG}} = \frac{.95 + 1.01}{2} = .98$$

$$Q_{P3} = 4700 \left(1 - \frac{.98}{9.5}\right) = 4215 \text{ CFS}$$

$$\therefore \text{SURCHARGE} = 4.5'$$

1. STORAGE WILL REDUCE THE TEST FLOOD DISCHARGE BY 485 CFS OR 10.3 %
2. THE SPILLWAY CAN PASS 450 CFS OR 11.2% OF THE TEST FLOOD.
3. AT A TEST FLOOD DISCHARGE OF 4215, THE DAM WILL BE OVERTOPPED BY 3.0 FT

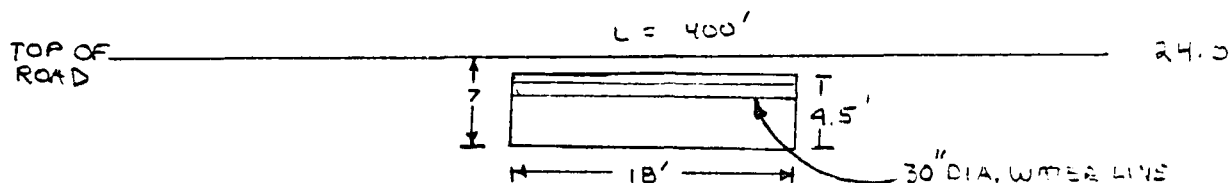
Job No. _____ Sheet 6 of 13
 Project _____ Date _____
 Subject _____ By DS Ch'k. by _____

ESTIMATE DOWNSTREAM IMPACT AREA

DISCHARGE WITH POOL @ TOP OF DAM = 1360 CFS

DEVELOPE RATING CURVES FOR DOWNSTREAM REACHES

REACH 1 - THIS REACH IS CONTROLLED BY THE ROXBURY ROAD
 BRIDGE, LOCATED 350' DOWNSTREAM FROM THE DAM



ASSUME ORIFICE FLOW THROUGH BRIDGE (TAILWATER = LOW CHORD ELEV.)

$$Q = CA \sqrt{2gh} \quad C = 0.5 \quad \text{NET AREA} = 18 \times 4.5 - (18 \times 2.5) = 36 \text{ sq ft.}$$

ASSUME WEIR FLOW OVER ROAD, $Q = CLH^{3/2}$, $C = 2.6$

ELEV	H _{BRIDGE}	Q _{ORIFICE}	H _{WEIR}	Q _{WEIR}	Q _{TOTAL}
24.0	3.0	250	0	0	250
26.0	5.0	325	2.0	2940	3265
27.0	6.0	350	3.0	5400	5750
28.0	7.0	380	4.0	8320	8700

COMPUTE DAM FAILURE DISCHARGE

$$Q_{\text{FAIL}} = \frac{8}{27} W_B \sqrt{g} Y_0^{3/2}$$

$$= \frac{8}{27} (60) \sqrt{32.2} 10^{3/2}$$

$$= 3190 \text{ CFS}$$

$$Y_B = .4 \times \text{DAM LENGTH @ MID}$$

$$\text{HEIGHT} = 150 \text{ FT}$$

$$= .40 \times 150 = 60 \text{ FT.}$$

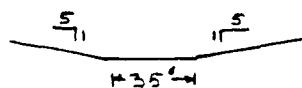
$$Y_0 = 10 \text{ FT}$$

TOTAL FAILURE DISCHARGE = 3190

$$+ \underline{450 \text{ (SPILL. Q)}}$$

$$\underline{\underline{3640 \text{ CFS}}}$$

CHECK NORMAL DEPTH UPSTREAM OF BRIDGE TO VERIFY CONTROL



$$n = 0.05 \quad S_f = .004$$

$$Q = \frac{1.486}{n} A R^{2/3} S_f^{1/2}$$

AT DEPTH = 8.3'

$$Q = 3635 \text{ CFS} \approx \text{DAM FAILURE DISCHARGE (3640)}$$

AD-A143 495

NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS
GORTON POND DAM (CT 0. (U) CORPS OF ENGINEERS WALTHAM
MA NEW ENGLAND DIV JAN 81

2/2

UNCLASSIFIED

F/G 13/13

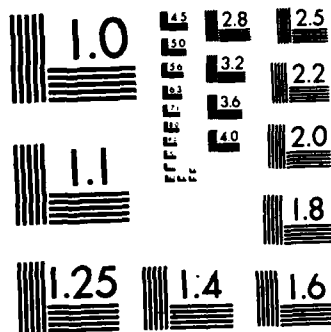
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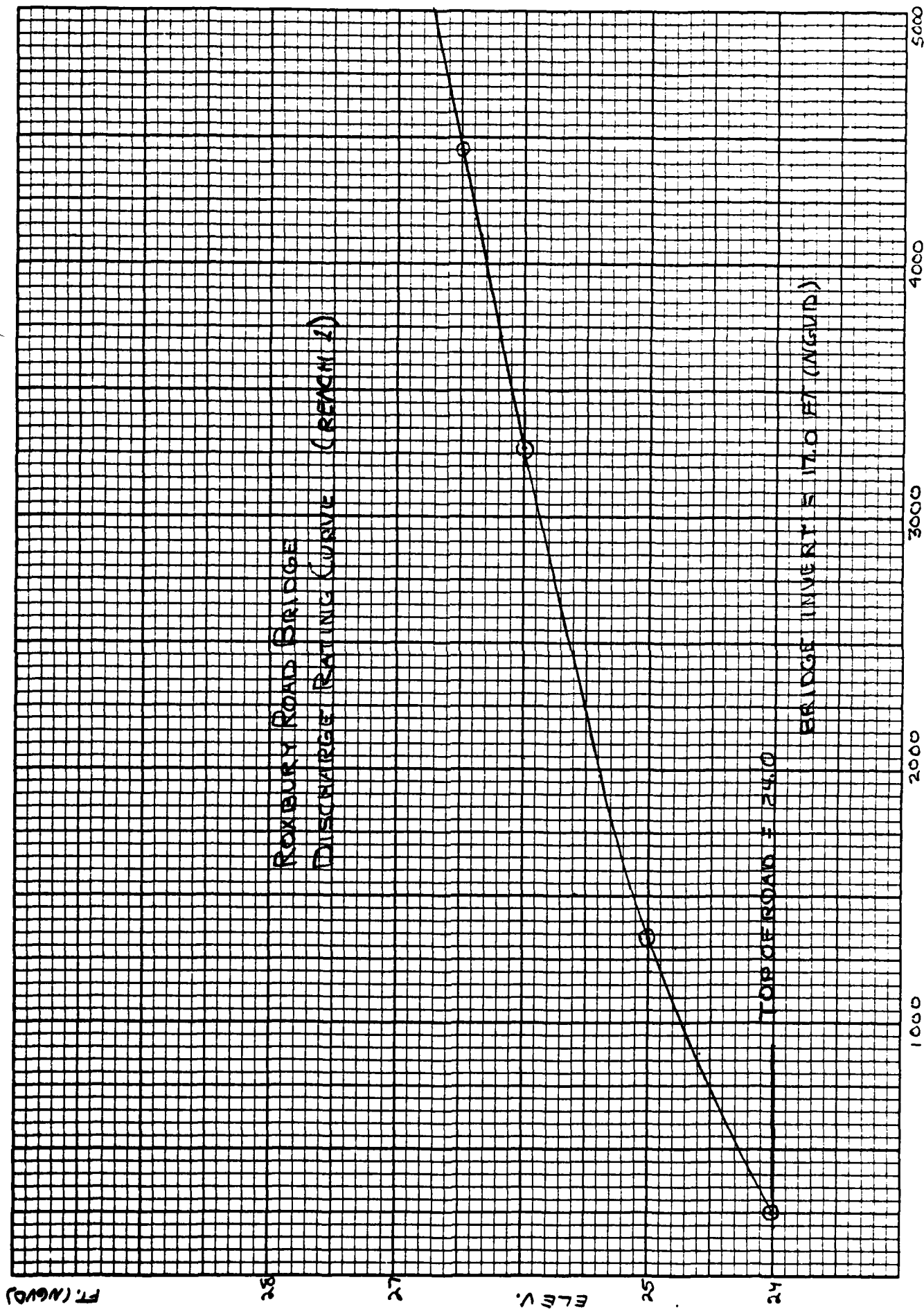
END

FILED

DATE



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A



Job No. _____ Sheet 8 of 13
 Project _____ Date _____
 Subject _____ By _____ Ch'k. by _____

DEPTH AT BRIDGE FOR $Q = 3640 = 9.3' > 8.3'$

\therefore BRIDGE ACTS AS CONTROL

FROM RATING CURVE FOR ROXBURY ROAD BRIDGE,

W.S. ELEV. @ MAX. SPILLWAY DISCHARGE, 450 CFS = 24.2

W.S. ELEV @ DAM FAILURE DISCHARGE, 3640 CFS = 27.3

- FOR REACH 1, DAM FAILURE WOULD INCREASE FLOODING
APPROXIMATELY 3.1 FEET
- TWO HOMES WOULD BE AFFECTED IN THIS REACH
DEPTH OF FLOODING \approx 1-2 FEET (BASED ON USGS TOPO)

ESTIMATE OUTFLOW FROM REACH 1

REACH LENGTH = 350' STORAGE VOLUME, $V_1 = \frac{770 \times 350}{43560} = 6.2$ AC-FT
 DEPTH = 9.3' AREA = 770 SQ. FT.

$$Q_{P2} = \left(1 - \frac{V_1}{S}\right) Q_{P1} = \left(1 - \frac{6.2}{550}\right) 3640 = 3600 \text{ CFS}$$

@ 3600 CFS DEPTH = 9.3'

\therefore NO FURTHER ITERATIONS ARE NECESSARY

REACH 2

DEVELOP STAGE-DISCHARGE RATING CONTROL SECTION

$$n = 0.05 \quad S_f = 0.004 \quad Q = \frac{1486}{n} A R^{2/3} S_f^{1/2}$$



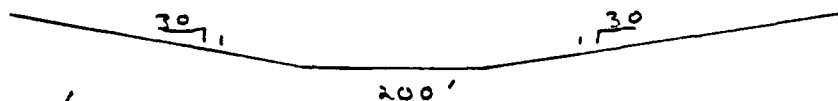
<u>STAGE</u>	<u>AREA</u>	<u>Q</u>
3	135	375
4	220	722
5	325	1218
6	450	1882
7	595	2735
8	760	3793
9	945	5074

CONTROL SECTION IS
 LOCATED AT THE DOWNSTREAM
 END OF BUSH POND

Job No. _____ Sheet 9 of 13
 Project _____ Date _____
 Subject _____ By _____ Ch'k. by _____

ESTIMATE OUTFLOW FROM REACH 2

ESTIMATE STORAGE IN REACH — CONTROL SECTION DOES NOT REFLECT
 ACTUAL STORAGE IN REACH, SECTION BELOW IS TYPICAL OF
 THIS REACH



@ STAGE = 8'±

AREA = 3520 SQ. FT. REACH LENGTH = 1400'

$$V_1 = \frac{3520 \times 1400}{43560} = 113.1 \text{ AC-FT}$$

$$Q_{P2} = (1 - \frac{113.1}{540}) 3600 = 2850 \text{ CFS}$$

@ 2850 CFS STAGE = 7.8' $V = \frac{299.5 \times 1400}{43560} = 96.3 \text{ AC-FT}$

$$V_{AVG} = \frac{96.3 - 113.1}{2} = 104.7 \text{ AC-FT}$$

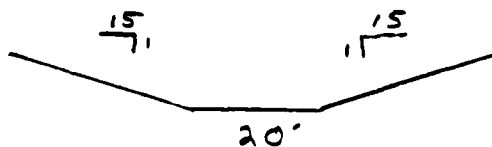
$$Q_{P2} = (1 - \frac{104.7}{540}) 3600 = \underline{2900 \text{ CFS}}, \text{ STAGE} = 7.8 \text{ FT}$$

REACH 3

REACH LENGTH = 3300 FT $n = 0.05$ $S_f = 0.004$

DEVELOP STAGE-DISCHARGE RATING; $Q = \frac{1.48}{n} A R^{2/3} S_f^{1/2}$

STAGE	AREA	Q
3	195	536
5	475	1770
7	875	4004



@ $Q_{P1} = 2900$, STAGE = 6.7'

AREA = 700 SQ. FT. $V_1 = \frac{700 \times 3300}{43560} = 53.1 \text{ AC-FT}$

$$Q_{P2} = (1 - \frac{53.1}{540}) 2900 = 2615 \text{ CFS}; \text{ STAGE} = 5.9$$

@ 5.9 FT, AREA = 640 SQ. FT. $V_2 = \frac{640 \times 3300}{43560} = 48.5 \text{ AC-FT}$

$$V_{AVG} = \frac{53.1 + 48.5}{2} = 50.8$$

$$Q_{P2} = (1 - \frac{50.8}{540}) 2900 = \underline{2430 \text{ CFS}} \quad \text{STAGE} = \underline{6.0 \text{ FT}}$$

Job No. _____ Sheet 10 of 13
Project _____ Date _____
Subject _____ By DS Ch'k. by _____

EFFECTS OF DOWNSTREAM FLOODING

REACH 1 - DAM TO ROXBURY ROAD

THERE ARE 1-2 HOMES WITHIN THIS REACH WHICH COULD
BE SUBJECT TO FLOODING FROM A DAM FAILURE

DEPTH OF FLOODING = 8-9 FT ABOVE STREAMBED
= 1-2 FEET IN HOMES

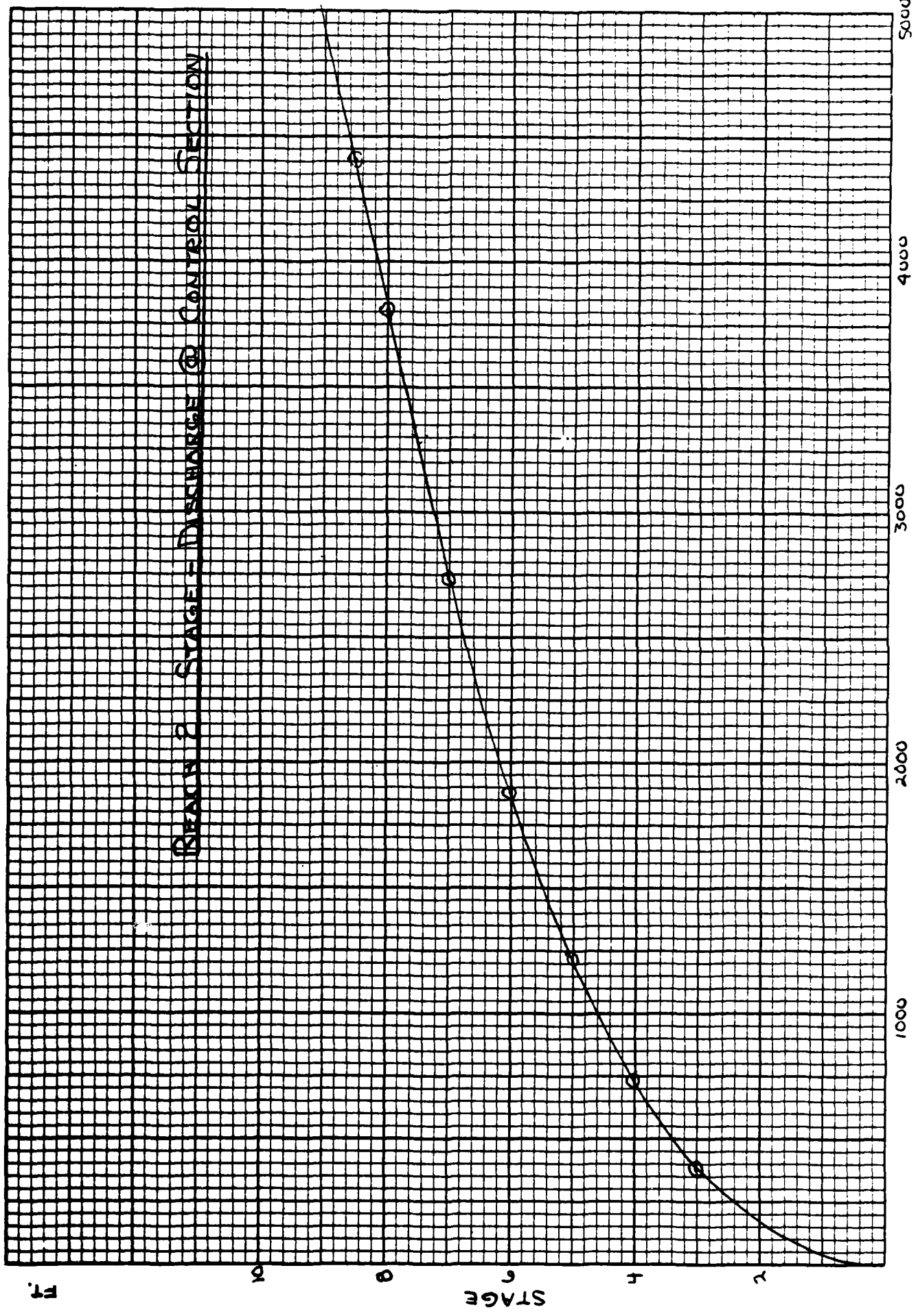
ROXBURY ROAD BRIDGE IS ALSO SUBJECT TO DAMAGE - THE MAIN WATER
SUPPLY LINE FOR EAST LYME PASSES THROUGH THE BRIDGE.

REACH 2 - ROXBURY ROAD TO DOWNSTREAM OF BUSH POND

THERE ARE 1-2 HOMES IN THIS REACH WHICH COULD BE SUBJECT
TO FLOODING FROM A DAM FAILURE.

DEPTH OF FLOODING = 7-8 FT ABOVE STREAMBED
= 1-2 FT IN HOMES

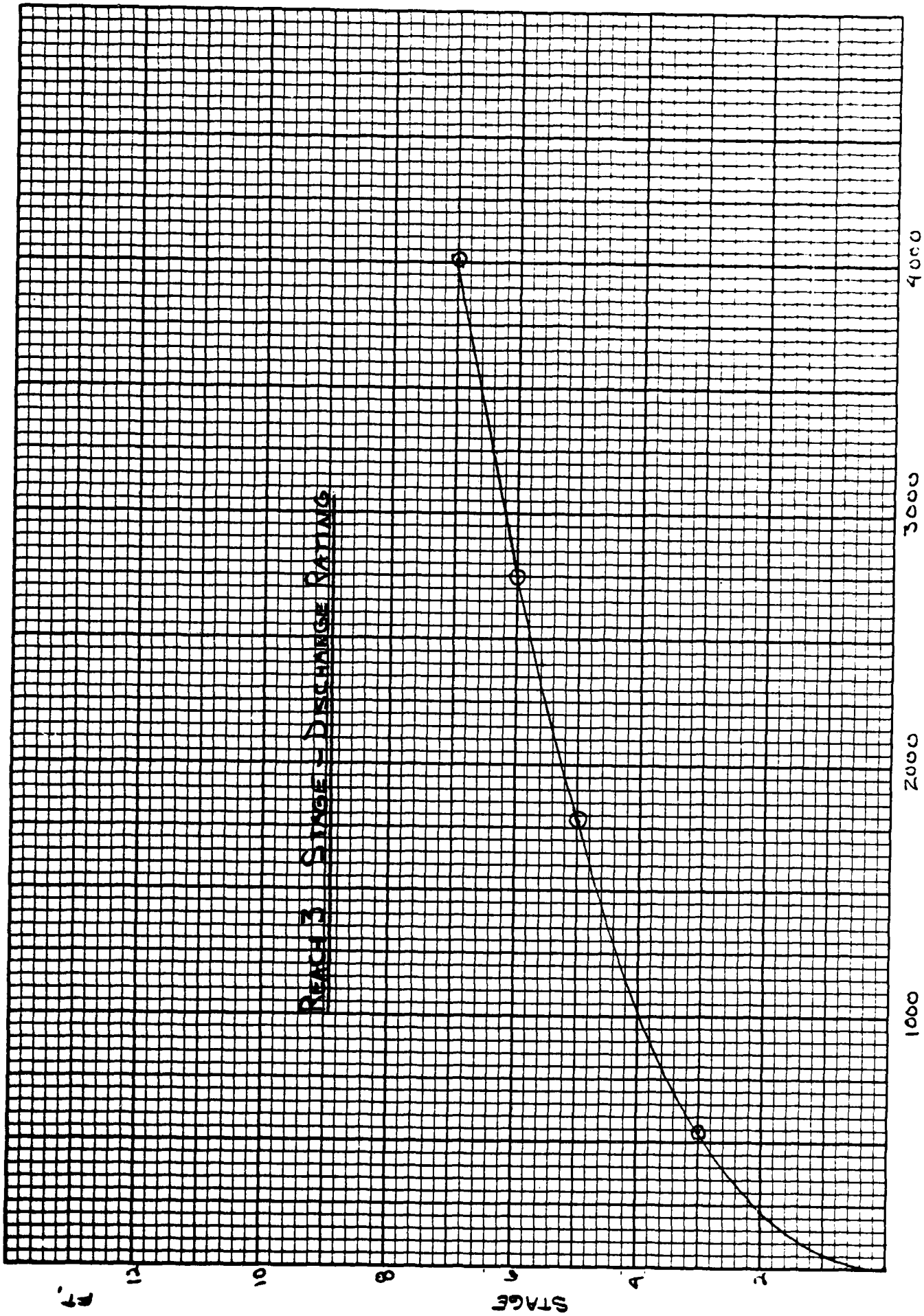
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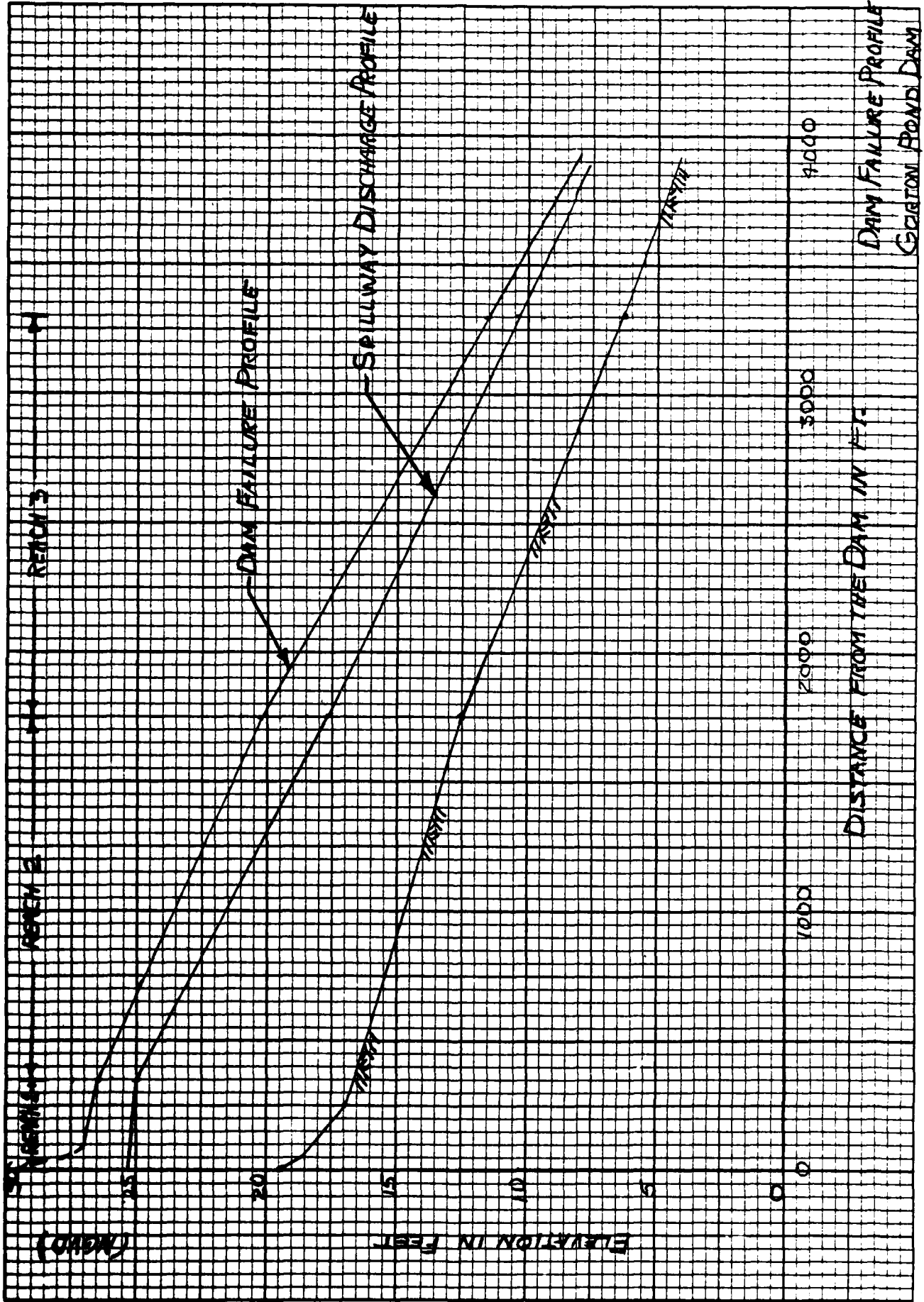
12/13

CFS

Q



REACH 3 STAGE - DISCHARGE CURVE

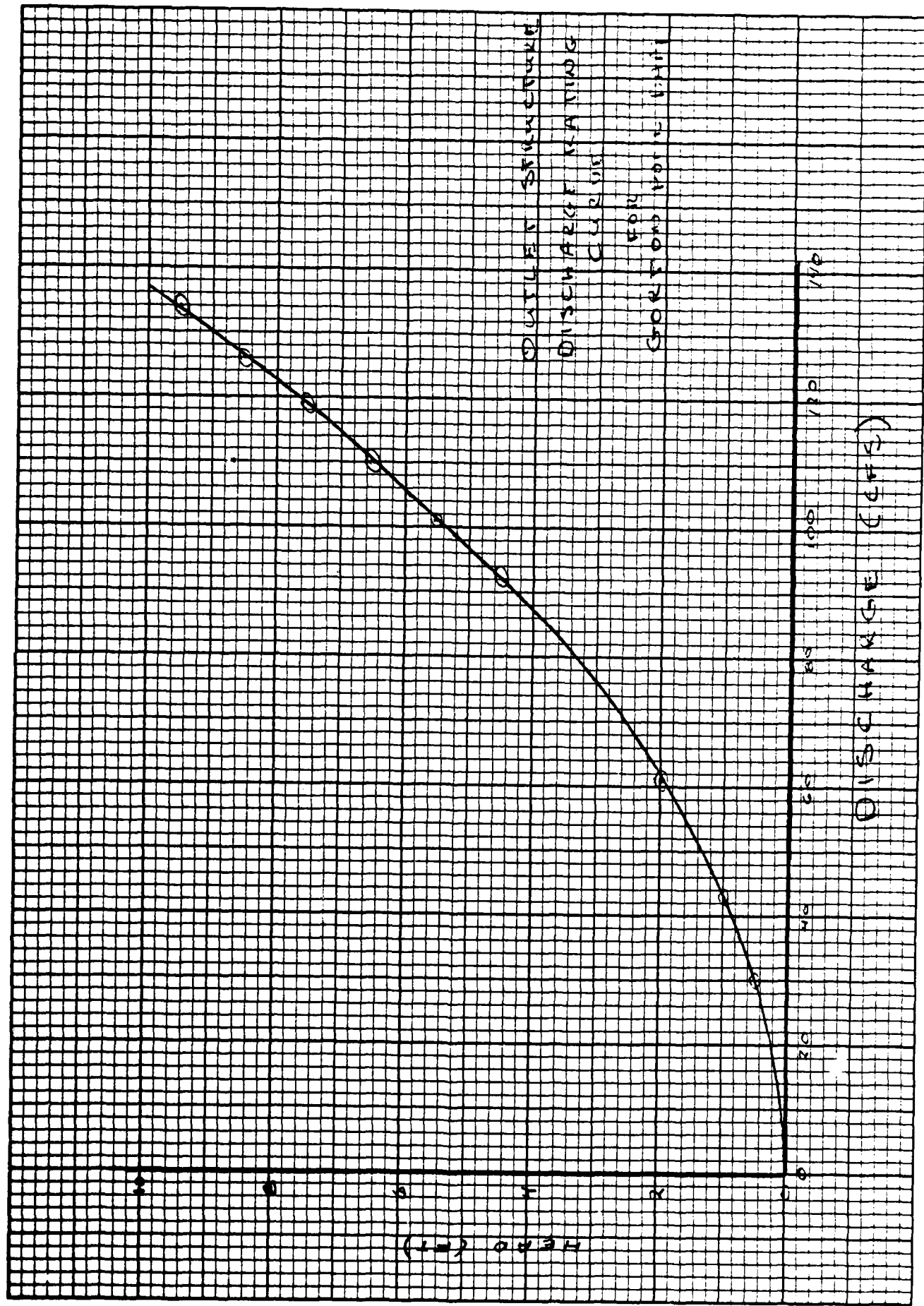


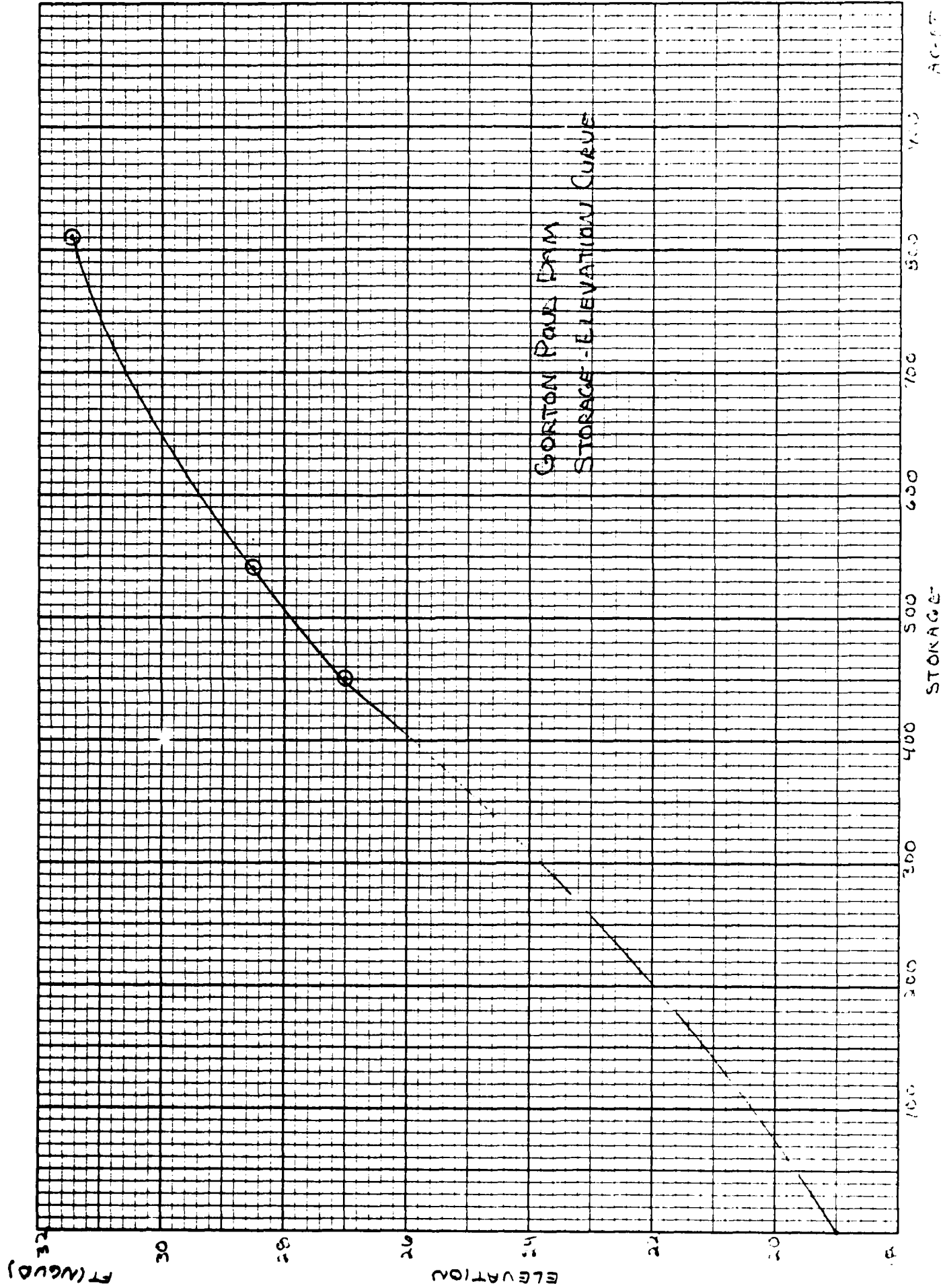
DAM FAILURE PROFILE
GORTON POND DAM

DISTANCE FROM THE DAM IN FEET

REACH 1 REACH 2 REACH 3

ELEVATION IN FEET





APPENDIX E

INFORMATION AS CONTAINED IN THE NATIONAL
INVENTORY OF DAMS

INDEX

(10)	(9)	(11)	(12)	(13)	(14)	(15)
POPULAR NAME		NAME OF IMPROVEMENT				
		GORTON POND				
NEAREST DRAIN		RIVER OR STREAM	NEAREST DOWNSTREAM CITY - TOWN - VILLAGE	DIST. FROM DAM (MI.)		POPULATION
0000	PA'AGUA	SET W/TH	NIANTIC	1		8000

(1)	(2)	(3)	(4)	(5)	(6)	(7)
(A) TYPE OF DAM	(B) YEAR COMPLETED	(C) PURPOSES	(D) STAVE HEIGHT FEET	(E) HYDRAU. HEIGHT FEET	(F) POUNDING CAPACITIES	
					(G) MAXIMUM (ACRE-FT.)	(H) NORMAL (ACRE-FT.)
1000	1950	X	10	9	210	450
					NED	N N N N

REMARKS												
2) - (A) SLOPE, UP, DOWN, STREAM SLOPE 2244 APPROXIMATE YEAR REMAINED 1974 + 1977												
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
D/S HAS	SPILLWAY	MAXIMUM DISCHARGE (CFS)	VOLUME OF DAM (CY)	POWER CAPACITY INSTALLED (KW)	PROPOSED (KW)	NO. OF TUNNELS	LENGTH OF TUNNEL (FT)	WIDTH OF TUNNEL (FT)	HEIGHT OF TUNNEL (FT)	DEPTH OF TUNNEL (FT)	WIDTH OF TUNNEL (FT)	HEIGHT OF TUNNEL (FT)
1	225	1	22	930								

(a)	(b)	(c)	(d)
OWNER	ENGINEERING BY	CONSTRUCTION BY	
STATE & CT LLP	UNKNOWN	UNKNOWN	

PROJECT	REGULATORY AGENCY			MAINTENANCE
	DESIGN	CONSTRUCTION	OPERATION	
100-100000		NONE	NONE	NONE

INSPECTION BY	INSPECTION DATE		AUTHORITY
	DAY	MO YR	
AT - POLAROID ENGINEERING INC	10	NOV 80	PL 92-367

REMARKS
COASTAL C.1 DEEPENING WIDTH 120 FT 33 315CFS FLOW FURNAKMENT